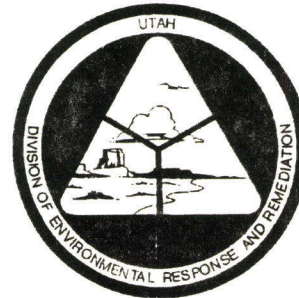


S/001/034  
Milford Copper  
Tailings

## ANALYTICAL RESULTS

# ESSEX COPPER PROCESSING PLANT

BEAVER COUNTY, UTAH  
EPA ID 988066064



# ANALYTICAL RESULTS REPORT

## ESSEX COPPER PROCESSING PLANT

Beaver County, Utah

UTD988066064

Utah Department of Environmental Quality  
Division of Environmental Response and Remediation  
Prepared By: Jason L. Knowlton

Draft 3/29/93

*Final 9/22/93*

*JLK*

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## 1.0 INTRODUCTION

The Essex Copper Processing Plant is an abandoned copper ore processing facility located near the town of Milford, in Beaver County, Utah. Sampling was conducted at the site by the Utah Division of Environmental Response and Remediation (DERR) on June 1 through June 3, 1992. A Sampling Plan, dated March 26, 1991, was prepared for the site which outlined the procedures to be followed for sampling this site. This report documents and describes the field procedures, and presents the analytical results from the sampling effort. A Site Inspection Data Summary form is included as Appendix A.

The sampling activities were undertaken as part of a focused Site Inspection under authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, commonly known as Superfund), and in accordance with applicable provisions of the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). The purpose of the Site Inspection is to gather data to support a site decision regarding the need for further Superfund action. DERR conducts these activities under agreement with the U.S. Environmental Protection Agency (EPA).

## 2.0 OBJECTIVES

The scope of sampling involved the collection of: 9 soil samples, 7 of which were collected from a large ore and tailings pile; 6 sediment samples, 4 from adjacent drainages and 2 from on-site processing ponds; 2 aqueous pond samples; 1 ground water sample from an off-site domestic well; and 3 high concentration source characterization samples, 2 of which were from electrical transformers and 1 was from a drum located on-site. A trip blank was also collected for quality control purposes.

The objectives of sampling, as specifically stated in the Sampling Plan, were as follows:

- The ore and tailings materials deposited on-site will be characterized, and drum, container and transformer contents will be identified, to determine whether the source materials present a significant hazard via the soil exposure pathway and whether hazardous materials on-site have a potential to release via the air migration pathway.
- Sediments, and surface water if present, in the Big Wash and in on-site pond areas will be characterized to further assess the on-site exposure hazards and to determine the nature of leachates in the water and their potential to migrate off-site via the surface and ground water migration pathways. Field observations of the drainage basin will be made to determine if surface water can migrate off-site, cross the levee, or otherwise release into the Big Wash drainage.

- Ground water monitoring wells will be constructed, and ground water sampled, to determine whether hazardous constituents from the site have contaminated the Milford area aquifer.
- Other location specific information, such as demographic analysis and water use survey, needed to effectively score the site under the revised HRS will be obtained during the sampling event. Waste characteristics, especially waste quantity and waste containment, will be evaluated for each waste source. Potentially impacted sensitive environments will also be identified.

Sampling objectives relating to ground water and source characterization were changed prior to the sampling event in compliance with recent EPA guidance which limits the scope of focused Site Inspections<sup>12</sup>. Ground water monitoring wells were not constructed, as called for in the Sampling Plan. Instead, a sample was collected from an existing off-site well. Characterization of transformer and container contents was limited to 3 samples, with more reliance on drum labels and information about the nature of operations to preliminarily determine container contents.

The sampling team consisted of the following UDERR personnel:

Jason Knowlton	Project Manager
Michael Storck	Health and Safety Officer
J. D. Keetley	Sampler

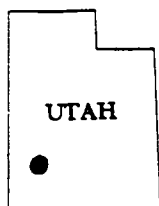
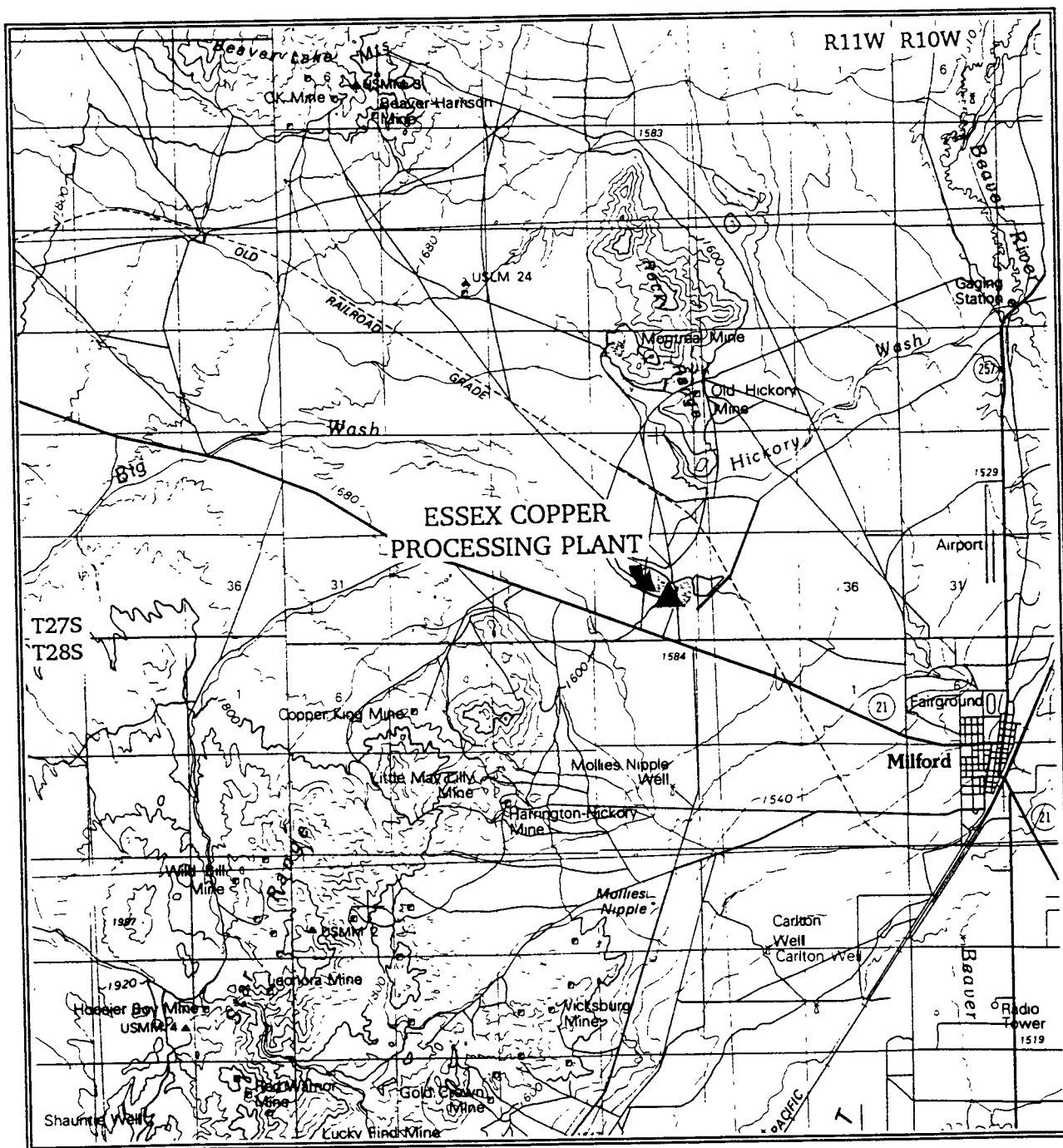
### 3.0 SITE DESCRIPTION

#### 3.1 Site Location and Description

The Essex Copper site is located approximately 3 miles northwest of Milford, Utah along the north side of State Highway 21, as indicated on Figure 1. The site consists of 142.7 acres; 72.7 acres on the south side owned by Anyox Metals, Ltd, and 70 acres on the north owned by Beaver County<sup>3</sup>. Figure 2 shows the site location in greater detail. A copy of the property boundary survey for the Anyox property, on file with the Beaver County Recorder, is attached as Appendix B.

The site is in the northern portion of the Escalante Desert in a fairly remote semi-arid area in the western portion of south-central Utah.

Sixty-four acres of copper ore and/or mill tailings and approximately 150 to 200 drums are present on-site. Many of the drums are full, corroded and/or leaking. There are several large storage tanks on-site, most of which contain only a small amount of solid material in their bottoms, and a few with unknown contents. One of these for liquid storage is marked "ACID". Numerous electrical transformers are present which may contain PCBs, many of which appear to be leaking. Several evaporation ponds are present on-site, constructed atop apparent tailing



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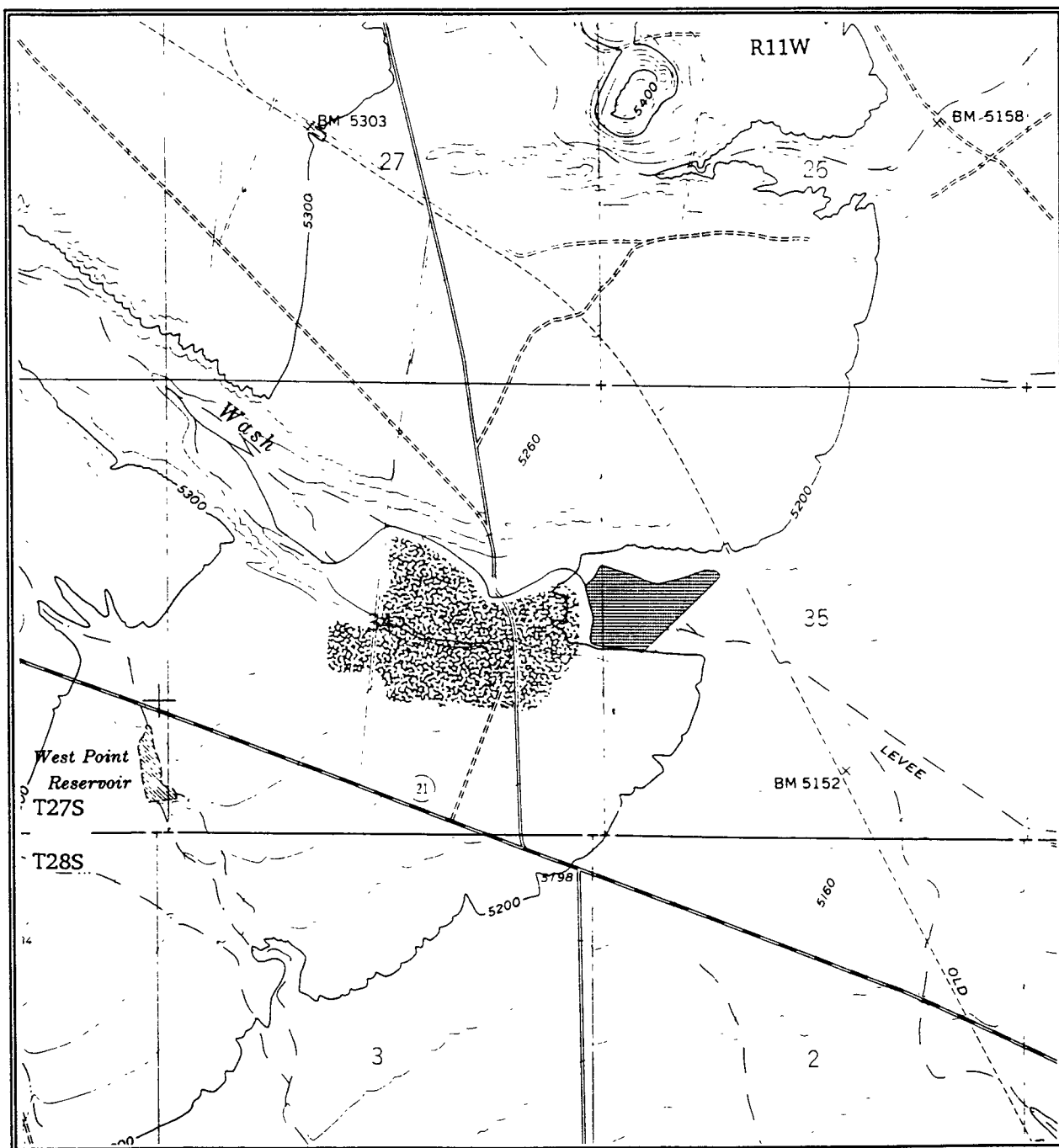
UTAH DEPARTMENT OF HEALTH  
BUREAU OF ENVIRONMENTAL RESPONSE AND REMEDIATION

Figure 1

SITE LOCATION

Essex Copper Processing Plant  
Beaver County, Utah

By	Date	Scale
JLK	9/19/90	1:100000



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# UTAH DEPARTMENT OF HEALTH

BUREAU OF ENVIRONMENTAL RESPONSE AND REMEDIATION

Figure 2

## DETAILED SITE LOCATION

Essex Copper Processing Plant  
Beaver County, Utah

By	Date	Scale
JLK	9/19/90	1:24000

materials. Blue to green colored standing water has been observed in these ponds during wet periods<sup>18,20,22</sup>.

Typical Basin and Range geology hosts the features present in the area on a regional scale. The Escalante Desert lies to the south and east of the site. To the west are the foothills and draws of the San Francisco Mountains. The Rocky Range and the mines of the Rocky Range Mining District are approximately two miles north<sup>13</sup>.

Quaternary lake sediments underlie the site to depths of about 480 feet where granite bedrock is encountered. Above these sediments are sands and gravels of the gently sloping alluvium of The Big Wash drainage. The first clay layer is encountered at a depth of 110 feet and is a mixture of clay and gravel<sup>7</sup>.

The ephemeral Big Wash drainage flows east along the northern portion of the site. It flows only during periods of snowmelt or intense rain<sup>7</sup>. A large levee extends north-south across the Big Wash to the east of the site, which impounds all surface water from the drainage and prevents further downstream flow<sup>13,18</sup>.

Average annual precipitation in Milford is 8.6 inches. Mean annual temperature is 48.3 degrees Fahrenheit. Average annual pan evaporation for April through October is 87 inches, largely due to wind. Net precipitation, based on monthly gross precipitation minus monthly pan evaporation, is 0.43 inches<sup>8</sup>. Inclusion of transpiration would undoubtedly lower this value further. Average monthly precipitation exceeds evaporation only in January. Two year, 24 hour rainfall data is not currently known, however, the daily maximum rainfall measured at Milford is about 2 inches<sup>5</sup>.

### 3.2 Operational History and Waste Characteristics

The site first came into private ownership as a patented claim by the Birch Ranch and Oil Company and has since undergone numerous changes in title and in operators. Arrangements were made in 1960 for the renovation of a 350 ton/day floatation mill for the processing of copper ore taken from the Rocky Range Mining District<sup>29</sup>. It is believed that this is the mill located on the Essex Site. The period of time for which tailings were dumped at the site prior to 1960 is not currently known. At the cease of operations in 1973 or 1974, the mill site was owned by the Shield Development Company of Toronto, Ontario and was operated on lease by Essex International, Inc.<sup>29</sup>. Sometime after mill operations ceased, a company known as CMI came onto the property and put up a sign showing their company logo. CMI's exact onsite operations are unknown<sup>22</sup>.

Current ownership of the site is divided: Anyox Metals, Ltd. bears title to 72.7 acres on the south, acquired from Shield Development; Beaver County owns 70 acres on the north, acquired through a tax sale from Essex International. The site is bounded on all sides by public land administered by the Bureau of Land Management<sup>2,3</sup>. Bene Johnson of Milford, Utah, is the caretaker of the mill site under the employ of the Shield Development Company, Ltd.

Ore and/or mill tailings, ranging in size from silt to small gravel, cover approximately 64 acres of the site<sup>10,18</sup>. Figure 3 is a site sketch which shows the on-site features. Pond areas have been formed on top of these tailings in several locations. Some of these ponds in the southwest portion of the site are lined with deteriorated plastic. These "evaporation ponds" contain fine-grained sediments, and periodically contain bluish to greenish colored water<sup>18,22</sup>.

The ore/tailings support little or no vegetation in contrast to off-site heavily vegetated ground<sup>20</sup>. Some of the coarser ore/tailings have been transported off-site for use as road gravels, and it has been alleged that they kill the surrounding vegetation when they get wet<sup>22</sup>.

The mill and processing area are located in the central portion of the site. Most of the structures are still standing but in disrepair, and debris is scattered about. Several large storage tanks, either mostly empty or with unknown contents, are located within the processing area. One large tank near the mill building which apparently has leaked, or is leaking, is marked "ACID". An underground storage tank is also suspected to be present on-site, evidenced by what appears to be a stand-pipe located south of the maintenance building in the vicinity of the oil shack<sup>18,20</sup>.

Present in outside drum storage and disposal areas, at 2 locations near the south side of the tailings pile, are 125-150 drums. Several drums are full and many of these are corroded and leaking. An estimated 50 drums are also scattered about in different locations throughout the site<sup>22</sup>. The drums mostly contain process chemicals including acids, dithiophosphate salts, and cresol<sup>1</sup>. Some of the drums with identifiable labels read, Van Waters and Rogers - "Silicate of Soda", American Cyanamid Co. - "Aerofloat 25 Promoter," "Aero 412 Promoter," and DOW Chemical Co. - "Dowfroth 250 Flootation Frother<sup>18</sup>."

A number of electrical transformers, some of which contain polychlorinated biphenyls (PCBs), are located around the site. Several of these show indications of leakage<sup>18</sup>.

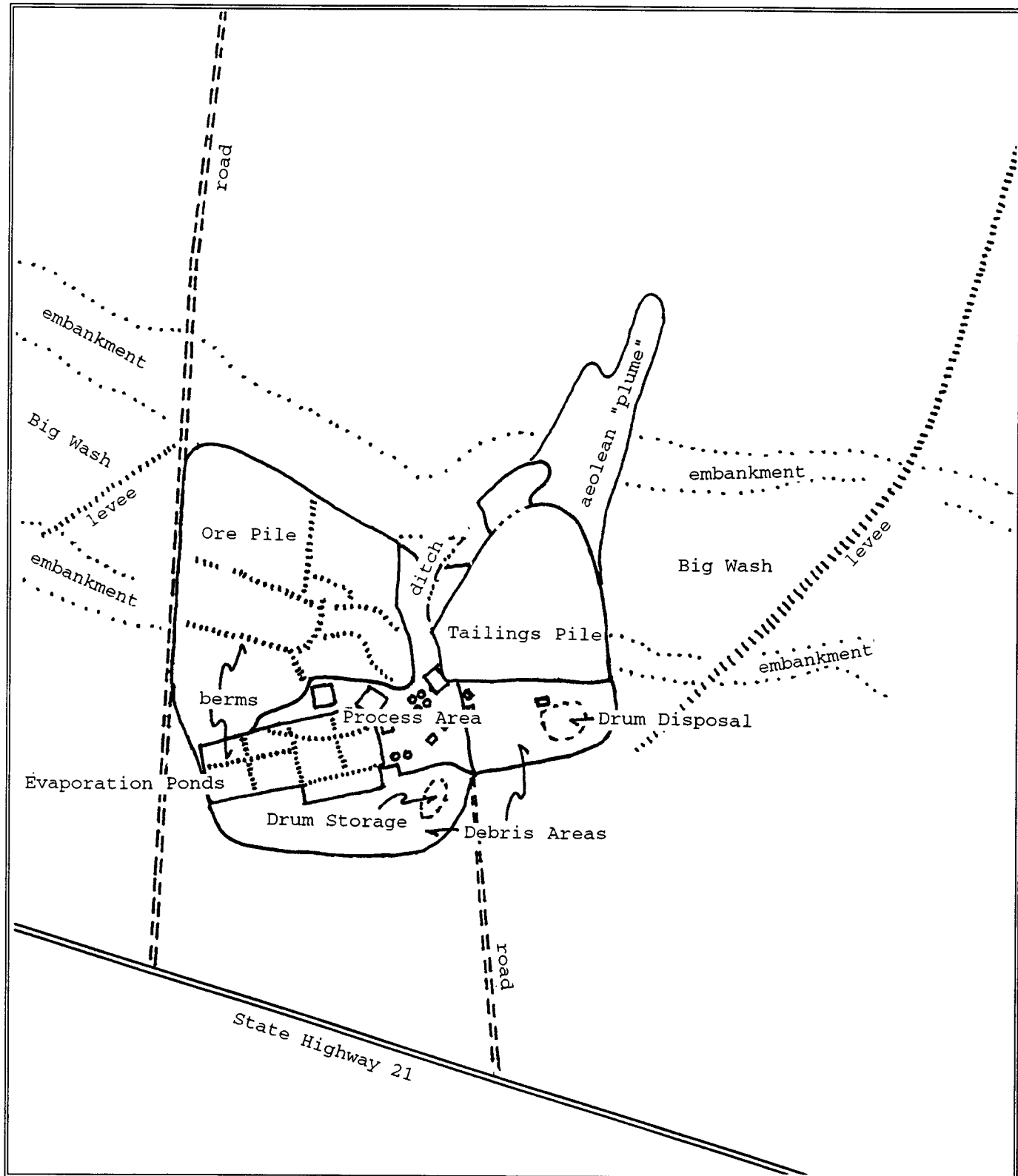
Occasional use of the site is apparent in the vandalism of on-site structures and through reports of off-road-vehicles (ORVs) and observed ORV tracks on-site<sup>6,18,20,22</sup>.

Except for the containers themselves, i.e., tanks, drums and transformer boxes, virtually no containment structures are present for any of the on-site sources. No secondary containment provisions are present for the tanks or containers<sup>18</sup>.

Off-site, a large levee extends NE-SW across the Big Wash to the east of the site. This impounds all surface water from the site and from The Big Wash drainage<sup>13,18</sup>. The only apparent outflow from this pond is through percolation to groundwater or evaporation.

### 3.3 Previous Investigations

Information from 2 DERR previous investigations has been utilized in the preparation of this report. The first of these is a Site Visit Report<sup>22</sup> for a site visit conducted April 27, 1988. The other is a Preliminary Assessment Report<sup>20</sup> dated December 5, 1989.



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FIGURE 3  
SITE SKETCH

By: JLK, 3/26/93. Scale: approx. 1:10,000



### 3.3.1 Site Visit Report

A site visit was conducted by DERR representatives on April 27, 1988 to inspect the site, in response to a complaint of abandoned drums and turquoise colored water at the site. The Site Visit Report identifies several potential sources of contamination and describes the site in fair detail. The report includes a site sketch and photographs.

### 3.3.2 Preliminary Assessment

A Preliminary Assessment, completed December 5, 1989, confirmed the findings of the previous site visit and evaluated the potential exposure pathways through hypothesized releases to the air, surface water and ground water pathways, site physical characteristics, and potentially affected targets. The Preliminary Assessment indicated potential ground water contamination to be the main concern at the site. The site sketch prepared during the previous site visit was also revised for the Preliminary Assessment.

## 4.0 FIELD ACTIVITIES

### 4.1 Sample Collection and Field Observations

Sampling was conducted in accordance with methods outlined in the DERR CERCLA Quality Assurance Project Plan (QAPP)<sup>21</sup> of November, 1989. An adequate quantity of disposable or previously decontaminated sampling equipment was supplied in order to avoid the need for field decontamination.

Water, soil and sediment samples, and one barrel sample, were shipped via Airborne Express to Skinner and Sherman Laboratory for analysis of total metals and cyanide under EPA's Contract Laboratory Program (CLP) Routine Analytical Services (RAS). The source characterization samples were hand-delivered to the Utah State Health Laboratory for PCB analyses of the transformer oil samples, and for organics and PCB analyses for the drum sample.

Field notes and photographs were taken throughout the sampling event to document sample locations, sampling methods, and field observations. Several of these photographs are included as Appendix C. The remainder of the photographs, and the field notes, remain in the DERR file for the Essex site, or in the possession of the Project Manager.

All samples were preserved as per the DERR QAPP, and cooled with ice to 4 degrees Celsius. Only certified CLP sample containers were used. The appropriate sample containers for each specific media and respective analyses are listed in Table I. The containers were provided by I-Chem Research and Eagle-Picher.

The weather during the sampling event was clear, hot and dry, with strong gusty winds. At one point during the sampling event, a large "dust devil" occurred on-site, kicking up a large amount

**Table I** Sample Containers

---

Water Samples	
Total Metals --	One - 1 liter plastic bottle per sample, preserved with nitric acid to a pH < 2.
Cyanide --	One - 1 liter plastic bottle per sample, preserved with sodium hydroxide to a pH > 12.
Soil and Sediment Samples	
Total Metals and Cyanide	One - 8 ounce wide-mouth glass bottle per sample.
Source Characterization Samples	
All Parameters	One - 8 ounce wide-mouth glass bottle per sample.

---

of dust, tearing off and carrying with it, siding from the buildings, and other large objects high in the air. The owner of the nearest residence, and the ground water well which was sampled, stated that dust is commonly blowing off the ore/tailings pile towards the north.

Permission for access to evaluate and sample the site was given verbally by the site caretaker prior to going on-site, and the combinations for the 2 locks on the cable gates were given to the site Project Manager to allow for unlimited access. Split samples were offered and refused. A Consent for Access to Property form was signed on June 2, 1992, and is included here as Appendix D.

As with many ore processing facilities in Utah, the Essex site appeared to have been abandoned with the intention of starting back up should economic conditions make this viable. A large amount of equipment and supplies were left on-site, as well as paperwork. Catalogues, assay reports, equipment specifications, process diagrams and flowcharts, and other reports were present in the maintenance building offices.

The Project Manager investigated allegations of off-site utilization of the ore/tailings material. An area was noted on-site with yellow-brown gravel which appeared to have been a location of ore/tailings excavation. These allegations were further confirmed through a discussion with the person responsible for the off-site distribution of this material, who stated that most of the gravel removed from the site goes to roads and driveways in nearby Beaver City. This person was informed by the Project Manager that although the hazardous nature of the Essex gravel was not

fully known, the State was concerned that the material may contain "potentially hazardous" concentrations of heavy metals<sup>30</sup>.

A representative from Utah Power and Light Company inspected the site for live electrical power sources, and determined that all the power lines on the site were dead, except for one wire along the north part of the site. He also stated that he was vaguely familiar with the past site operations, and he recalled very large quantities of acid being utilized by the facility for their process.

Several dead and partially decomposed predatory birds, about the size of a raven or small hawk, were present in the bottom of a large open tank located at the south side of the processing facility. It is not known whether the cause of death was chemically related, or from human activity. Spent shotgun shells were present at several locations throughout the site. A live raven was also present inside the mill building which may have been nesting nearby. This raven would not move from its perch on a tank access ladder, even when approached by the sampling team to within a few feet.

The accessible tanks on-site contained only small amounts of solid material in their bottoms. The contents of inaccessible tanks remain undetermined. The contents and quantity of material in a liquid storage tank marked "ACID" also remain undetermined. A sulfur-like precipitate was present beneath this tank which had a pH of less than 2, when wetted.

The apparent underground storage tank filler pipe was determined to be plugged at a depth of about 12 inches. No organic vapors could be detected with a photoionization detector, placed near the top of the pipe. The possible presence of an underground storage tank remains unconfirmed.

#### 4.2 Quality Assurance/Quality Control

Air monitoring instruments were calibrated each day prior to their use. Water monitoring instruments were calibrated according to manufacturers instructions immediately prior to the collection of water samples. Field monitoring equipment consisted of a pH/temperature/conductivity/oxidation-reduction-potential meter, for water sampling, and a photoionization detector and an oxygen/combustible gas/carbon monoxide meter for air monitoring.

Documentation procedures included the completion of all CLP forms and tags for RAS inorganic analyses. Strict Chain of Custody was maintained and Chain of Custody forms were filled out to accompany each shipment. Copies of these forms are included as Appendix E. Samples for RAS metals and cyanide analyses were shipped to Skinner and Sherman Laboratory of Waltham, Massachusetts. Source characterization samples were hand-delivered to the Utah State Health Laboratory in Salt Lake City.

Validation of the analytical results was conducted by Versar Architects and Engineers, Inc. under contract with DERR. Most data were deemed acceptable, however, several problems were discovered resulting in: "J" and "UJ" qualified, or estimated and estimated/undetected, respectively, data for several analytes in water and soil samples; and "R," or rejected data for antimony, arsenic, barium, chromium, lead, selenium and vanadium in water samples. The data tables of Appendix F reflect these qualifications. Appendix G presents the data validation report submitted by Versar, along with the validated CLP Data Sheets.

Due to the limited number of environmental water samples collected, only one field quality assurance sample was collected. This sample, EC-PW-03, consisted of store bought distilled water, added to a sample container, and preserved in the same manner as the environmental samples. The sample was collected to determine whether sample preservation, handling or shipping may have added contamination to the samples. Only aluminum and magnesium were detected in this sample, and these were at concentrations below the CLP Contract Required Detection Limit.

## 5.0 WASTE/SOURCE CHARACTERISTICS

Five well-defined sources have been recognized at the Essex Copper site, along with several other lesser sources or potential sources. These 5 sources potentially exhibit acute and chronic toxicity, and carcinogenic characteristics, if an individual were exposed, and consist of both liquid and solid media. No significant containment features are known to be present for any of the sources. Source locations are delineated on Figure 4.

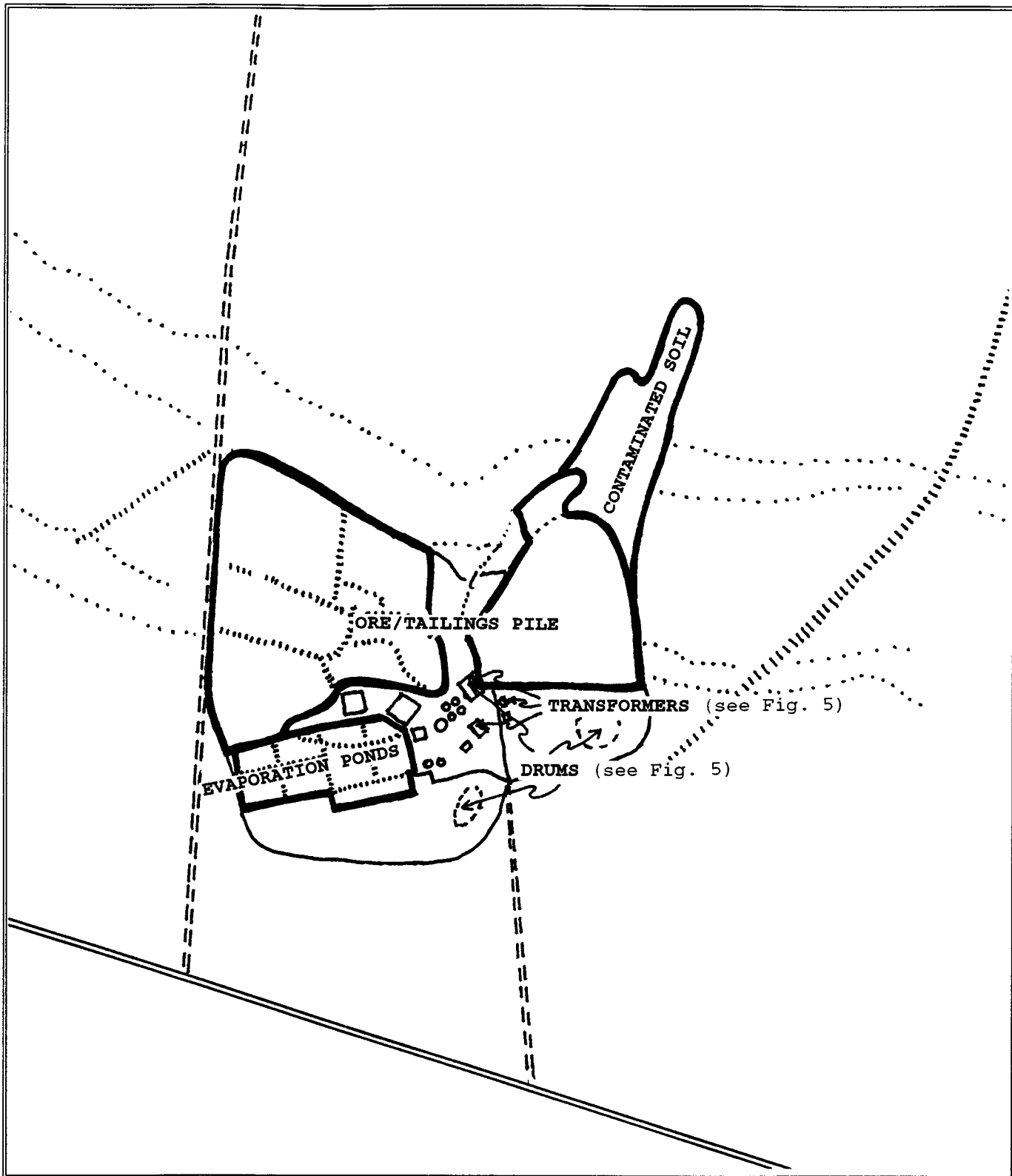
### 5.1 Source Descriptions

#### 5.1.1 Ore/Tailings Pile

Approximately 64 acres of the site are covered with ore/tailings to an undetermined depth, most of which appear to have been deposited directly into the Big Wash drainage<sup>10,13</sup>.

In the western portion of the site, the ore/tailings consists of orangish-brown to gray-brown coarser grained material. A network of impoundment-forming berms have been constructed atop the pile in the northwest portion of the site, and several pond depressions have been constructed in the southwest portion, also atop the pile. The berms have been severely breached by large gullies flowing northward off the site toward the Big Wash. An alkali surface is present in several locations atop the tailings<sup>18</sup>. The physical characteristics of the material to the west of the mill buildings give the impression that this may be the ore utilized in the floatation recovery process.

In the east portion of the site the material in the pile consists of sharply defined areas with; dark-gray, yellowish-brown, and reddish-brown fine grained material. The color appears to be related to the degree of oxidation of the material<sup>18</sup>. This material may be the spent tailings from the recovery process.



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FIGURE 4  
SOURCE LOCATIONS

By: JLK, 3/26/93. Scale: approx. 1:10,000

Aeolian erosional and material transport characteristics are prevalent over the entire waste pile. Large dunes and smaller ripple structures are present over the western portion of the pile. The surface of the eastern portion of the pile has several textural characteristics resembling a blowout depression<sup>18</sup>. A large aeolian deposited "plume" is apparent to the north of the tailings area on the aerial photographs of the site<sup>10</sup>.

#### 5.1.2 Evaporation Ponds

Several pond depressions have been constructed atop approximately 9 acres of the pile in the southwest portion of the site which appear to be evaporation processing ponds. Four of the larger ponds are present along the south site boundary, the 3 westernmost of which contained clear blue to green water during the sampling event. The sediment in these ponds was brownish-gray with a bluish color at the surface in some locations<sup>18</sup>. A deteriorated plastic lining was apparent at the edges of some ponds<sup>18,22</sup>. Several smaller ponds are also present along the north side of the 4 large ponds and along the southern edge of the site adjacent to the larger ponds<sup>10,18</sup>.

#### 5.1.3 Drums

Contents of the drums were estimated by labels, sampling data, and similarity in appearance, for 58 40-gallon and 55-gallon drums located on-site, in an effort to define this source of contamination. Twenty-six of these are located in the mill building, and 32 are located in the drum storage area. Several other drums and other containers are also located at these areas, and other locations throughout the site, which have not been characterized with regard to their contents<sup>18,22</sup>. Figure 5 shows the location of these containers, keyed to container descriptions of Table II.

The 26 drums in the mill building are in a semi-confined room on a concrete floor. The drums are extremely corroded and leaking. The partially legible labels indicate that the material is from the American Cyanide Company. Four 55-gallon drums read "AEROFLOAT 25," and 22 40-gallon drums read "AERO 412." A very strong "inorganic" odor permeated the room<sup>18</sup>.

Most of the 32 55-gallon drums present in the drum storage area were bulged, corroded, and/or leaking. Soil contamination was also apparent in this area. Three of these drums had yellow tops and were labeled "DOWFROTH 250." The other 29 drums were very similar in outward appearance, and in appearance and physical character of their "tarry" contents<sup>18</sup>.

A drum disposal area in the southeast portion of the site contains several empty, or nearly empty, drums, most of which bear the label, "DOWFROTH 250<sup>18</sup>."

#### 5.1.4 Transformers

Electrical transformers and capacitors are present at several locations at the site which potentially contain PCBs, as shown on Figure 5 and summarized on Table III. The total volume of oil on-



**Table II Container Summary**

<u>Location</u>	<u>Quantity/ Capacity</u>	<u>Description</u>
1: Maintenance		
Building	1/55 gal.	Oily material
	3/5 gal.	Grease
	5/1 gal.	"Nalco Activator"
	4/1 gal.	"Toluene Solvent"
	2/3 gal.	"Nordbak Resin" grout mixture?
	2/90 lb.	"DOW" powder in bags
	1/7 gal.	"Amoniated Cleaner"
	1/5 gal.	"Quick Drying Aluminum Formula"
	1/55 gal.	Unknown
	6/5 gal.	Oil or grease
	2/80 lb.	"Calcium Chloride" in bags
	7/1 gal.	Unknown
	2: Oil Shack	1/55 gal.
3: Mill		
Building	3/55 gal.	"Texaco Transformer Oil"
	4/55 gal.	"American Cyanamid - Aerofloat 25 Promoter"
	22/40 gal.	"American Cyanamid - Aero 412 Promoter"
	5/5 gal.	"Texaco Crater 2" oil or grease?
	2/55 gal.	Unknown
	1/120 lb.	"Pinion Grease"
4: Drum Storage		
Area	1/55 gal.	Brown oil
	1/55 gal.	"Sinclair Oil"
	7/55 gal.	Unknown
	29/55 gal.	Brown to black oil and sludge with tarry material on lids
	3/55 gal.	"Dowfroth 250"
	1/55 gal.	"Silicate of Soda"
	1/40 gal.	white powder with pH > 12
5: Drum Disposal		
Area	Several empty or mostly empty "Dowfroth 250," and other, 55 gallon drums. A small pit is also present in this area in which several buried drums were observed partially protruding from the soil.	
6: Assay		
Office	Several small containers of various chemicals.	



**Table III Transformer Summary**

<u>Location</u>	<u>Quantity/ Capacity</u>	<u>Description</u>
A: Maintenance		
Building	3/200 gal.	"Gregory Electric" transformer - pad mounted
	1/30 gal.	"General Electric Spirakore Transformer" - loose
	30/1.3 gal.	"General Electric Pyranol Capacitors" - loose
B: Mill		
Building	3/150 gal.	transformer - pole mounted
	3/200 gal.	transformer - pole mounted
C: Control		
Building	3/200 gal.	unlabeled transformer - pad mounted
	1/20 gal.	"Zinsco" transformer - loose

site in this abandoned electrical equipment is estimated at approximately 2340 gallons. Two 55-gallon drums labeled "transformer oil" are also located in the mill building<sup>18</sup>.

#### 5.1.5 Contaminated Soil

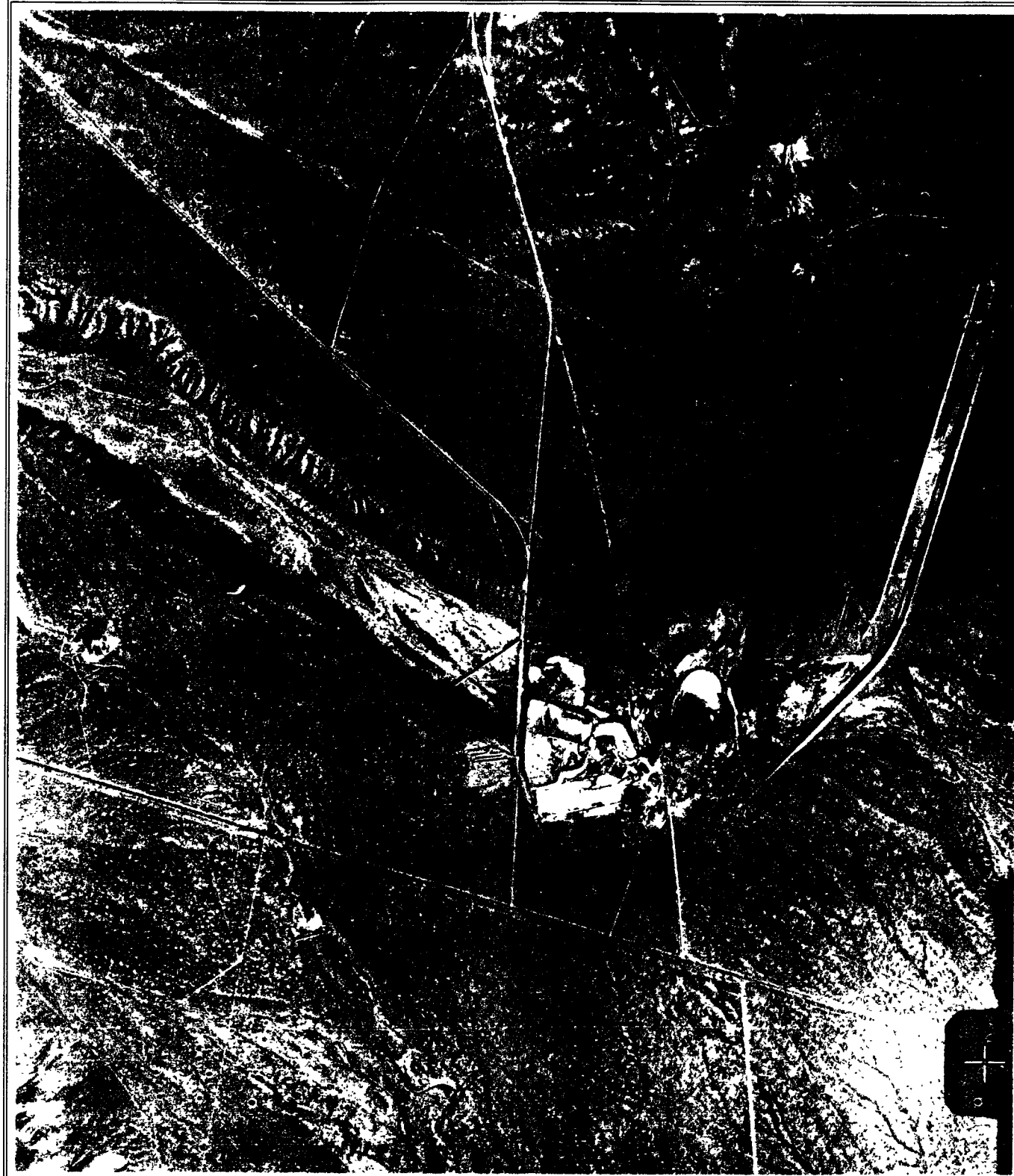
A large area of apparent wind deposited soil extends north of the east side of the site, as shown on the aerial photograph of Figure 6. The total extent of this off-site soil contamination is not well known, and several other areas of soil contamination are likely to be present.

### 5.2 Sample Locations

Table IV summarizes the sample locations and briefly describes the sampled material. Figure 7 shows the sample locations.

#### 5.2.1 Ore/Tailings Pile

Seven soil samples were collected from the waste pile at locations shown on Figure 7. The samples were collected with a stainless steel spoon from the soil surface, and these were all collected as "grab samples," except sample EC-SO-03. Sample EC-SO-03 was composited from



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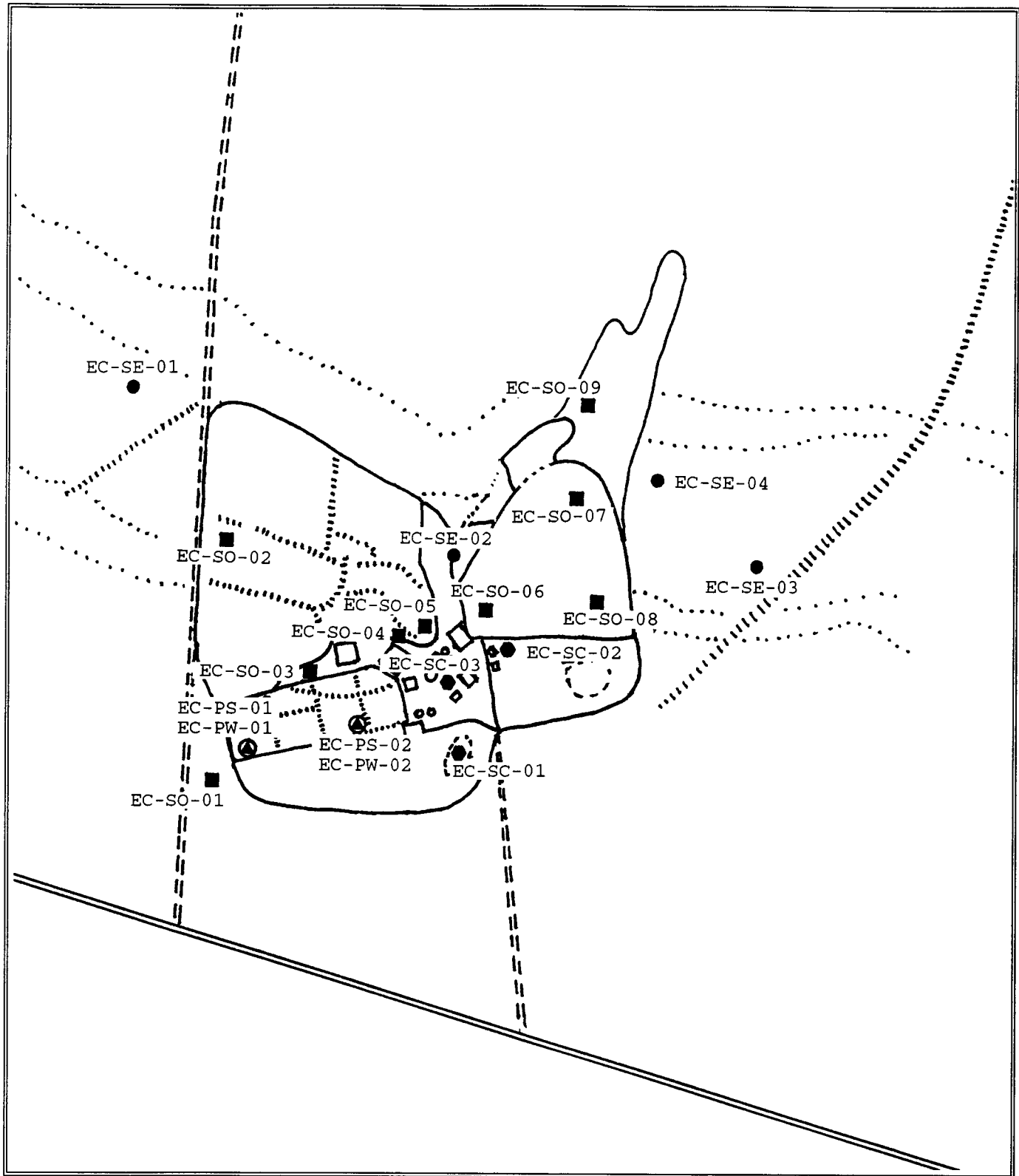
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RESPONSE AND REMEDIATION

ESSEX COPPER PROCESSING PLANT  
FIGURE 6  
AERIAL PHOTOGRAPH

Source: USDA-ASCS, 1978. enlarged 200%

**Table IV Sample Summary**

<u>Sample Number</u>	<u>Sample Location</u>	<u>Sample Description</u>
EC-SO-01	Background	Medium-brown poorly-sorted sand
EC-SO-02	West pile	Dark-gray-brown silt with alkali surface
EC-SO-03	South base of west pile	Composite -- medium-brown fine to medium-grained silt, dark-gray-brown silt, and medium-brown poorly-sorted sand
EC-SO-04	Excavation area	Yellow-brown gravel
EC-SO-05	North-central pile	Red-brown silt with alkali surface
EC-SO-06	East of mill area	Dark-gray to black fine-grained sand
EC-SO-07	Northeast pile	Yellow-brown, gray and brown fine-grained sand and silt
EC-SO-08	Southeast pile	Red-brown and yellow-brown fine grained sand and silt
EC-SO-09	North of site	Medium-gray-brown silty-sand
-----		
EC-SE-01	Upstream Big Wash	Tan to brown sandy-silt
EC-SE-02	Drainage ditch from mill area	Red-brown very-fine-grained sand and silt
EC-SE-03	Downstream Big Wash	Light-gray-brown silty sand
EC-SE-04	Probable point of Entry	Yellow-brown fine-grained sand and silt
-----		
EC-PS-01	East pond	Brown to gray silt with blue surface
EC-PS-02	West pond	Dark-brown to gray sandy silt with black specks
-----		
EC-PW-01	East pond	Clear blue to turquoise water
EC-PW-02	West pond	Clear green to blue-green water with very-dark syrupy appearance
EC-PW-03	Trip blank	Store-bought distilled water
-----		
EC-GW-01	Off-site well	Clear colorless water
-----		
EC-SC-01	Drum # 13	Thick black oil with strong organic odor
EC-SC-02	Control Building	Light-brown transformer oil; HNu reading of 20
EC-SC-03	Maintenance Building	Light-brown transformer oil; HNu reading of 1



- = Soil Sample
- = Sediment Sample
- = Pond Sediment Sample
- ▲ = Pond Water Sample
- = Source Characterization Sample

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ESSEX COPPER PROCESSING PLANT  
FIGURE 7  
SAMPLE LOCATIONS

By: JLK, 3/26/93. Scale: approx. 1:10,000

3 different soil types exhibited within a very short distance from each other, near the base of a large hill forming the boundary between the apparent ore stockpile and evaporation pond area. Samples EC-SO-01 through EC-SO-05 were collected from the west side and consisted of the coarser grained "ore" material. Samples EC-SO-06 through EC-SO-08 were collected from the east side of the site, from "tailings" of fine-grained, distinctive areas of dark gray, yellow-brown, and red-brown, respectively.

#### 5.2.2 Evaporation Ponds

Two pond water samples, EC-PW-01 and EC-PW-02, and 2 pond sediment samples, EC-PS-01 and EC-PS-02, were collected from near the southern bank of 2 of the larger ponds of the evaporation pond area. The water samples were collected by submersing silicone tubing into the ponds and pumping the water through a peristaltic pump into the containers, with care taken not to disturb the sediments below. Sediment samples were collected with a stainless steel spoon after procurement of respective water samples.

Samples EC-PW-01 and EC-PS-01 were collected from the east-central pond. The sediment was a brown-gray silt with a blue color at the surface, and the water was blue to turquoise and had a pH of 2.3. Samples EC-PW-02 and EC-PS-02 were collected from the westernmost pond of the 4 large ponds. The sediment was a dark gray-brown sandy-silt with black specks, and the water was green to blue-green with a dark "syrup-like" appearance and a pH of 2.7.

All water samples were preserved with nitric acid and sodium hydroxide for respective metals and cyanide portions.

#### 5.2.3 Drums

Only 1 drum source characterization sample, EC-SC-01, was collected from one of the several on-site drums. This sample was collected from an unlabeled drum, marked in the field as #13, which was thought to be representative of 28 other unlabeled drums in the south drum storage area, based on drum appearance and character of the contents - a black oil, thin near the top and thick and sludgy at the base of the drum, with a strong cresol odor, and with a coating of thick, black, tarry material on top of the drums. HNu photoionization detector measurements elevated above background to about 5 parts per million (ppm) as the probe was placed through the bung opening. The sample was collected with a thin glass tube and placed in an 8-ounce glass jar.

#### 5.2.4 Transformers

Two transformer oil, source characterization samples, EC-SC-02 and EC-SC-03, were collected from the drain valves of 2 transformers located on-site. Sample EC-SO-02 was collected from the northernmost transformer of a group of 3 unlabeled transformers near the east side of the control building. An HNu measurement of 20 ppm was obtained when the probe was placed near the mouth of the sample container during sample collection. Sample EC-SC-03 was collected from a group of 3 "Gregory Electric" transformers located near the northwest corner of the

maintenance building. The HNu measured less than 1 ppm when the probe was held above this sample during collection.

#### 5.2.5 Contaminated Soil

Soil sample EC-SO-09 was collected from the soil surface approximately 600 feet north of the eastern portion of the tailings pile. A review of aerial photographs conducted after the sampling event revealed an apparent aeolean surface deposit or "plume" extending from the site through the area from which this sample was collected. The soil surface was very soft and the sample consisted of fine grained sand.

### 5.3 Analytical Results

Validated analytical results for soil and water samples are tabulated and presented in Appendix F. A sample validation report, prepared by Versar, is included as Appendix G, and includes the raw data tables received from Skinner and Sherman Laboratory, with qualifications noted in the margins. Analytical results for the higher concentration, drum and transformer samples, submitted to the Utah State Health Laboratory, are presented as Appendix H.

#### 5.3.1 Ore/Tailings Pile

Arsenic, chromium, copper, silver and zinc were elevated in the ore/tailings pile at concentrations exceeding 3 times that of respective background soil concentrations of sample EC-SO-01 (Appendix F). Copper and silver are the most consistently present hazardous substances in the waste pile, being elevated in all ore/tailings samples. Arsenic was elevated in all samples except EC-SO-04, collected from the apparent excavation area for off-site use of the material. Cadmium, lead and mercury were also present at elevated concentrations in the ore/tailings, compared to background, but their concentrations were well within normal soil levels.

Several other metals; calcium, iron, magnesium and sodium; were also elevated with respect to background. The most significant of these is iron, elevated in all samples except sample EC-SO-03, composited from near the base of the ore pile in the western portion of the site.

#### 5.3.2 Evaporation Ponds

Analytical results of the pond water samples (Appendix F), EC-PW-01 and EC-PW-02, show aluminum, cadmium, cobalt, copper, manganese, nickel, thallium and zinc to be of concern for this source. Beryllium and mercury were also detected and may be of concern. A large portion of the data - 7 analytes, including arsenic - for the water samples was rejected, however, due to quality control considerations. Calcium and magnesium were also present at high concentrations. Sediment samples, EC-PS-01 and EC-PS-02, show elevated concentrations of copper, and slightly elevated arsenic and silver, to be of concern.

Field measurements for pH, temperature and oxidation/reduction potential were collected for the pond water samples. Results of these are presented in Table V.

**Table V** Pond Water Field Measurements

<u>Sample #</u>	<u>Temperature</u>	<u>pH</u>	<u>Oxidation/ Reduction Potential</u>
EC-PW-01	19.7° C.	2.3	317 mV
EC-PW-02	19.5° C.	2.7	325 mV

### 5.3.3 Drums

Several toxic and/or incompatible/reactive constituents are present in high concentrations in the on-site drums. Table VI lists the constituents present, based on analytical results for sample EC-SC-01, and Material Safety Data Sheets (MSDSs), and summarizes the concerns over the drum contents. Table II also lists and describes several other drums and containers which are present on-site, and for which detailed information is not available. MSDSs from Dow Chemical and American Cyanamid, for the products mentioned earlier, are presented as Appendices I and J, respectively.

### 5.3.4 Transformers

Analytical results for the transformer samples indicate that PCBs are present on-site in transformer oil at potentially hazardous concentrations. PCBs were undetected in sample EC-SC-02, but were present at 1900 ppm, as aroclor 1260, in EC-SC-03, as shown on the laboratory forms of Appendix H.

### 5.3.5 Contaminated Soil

Arsenic, copper, lead, silver and zinc were elevated greater than respective background levels in off-site soil of sample EC-SO-09 (Appendix F), indicating a windborne migration of contaminants to the north. The lead value, however, was well within normal levels for soil, and the degree of contamination by silver is questionable due to qualification of the background data for quality control problems.

**Table VI Drum Contents**

<u>Description</u>	<u>Hazardous Compound</u>	<u>Concentration</u>
29 - 55 gallon unmarked drums (See sample EC-SC-01)	Benzoic acid	912,000 ppb
	4-Chloro-3-methyl phenol	26,300,000 ppb
	2,4-Dinitrophenol	23,500,000 ppb
	2-Methyl naphthalene	160,000 ppb
	2-Methyl phenol (o-cresol)	1,150,000 ppb
	3-Methyl phenol (m-cresol)	284,000 ppb
	4-Methyl phenol (p-cresol)	366,000 ppb
	Phenol	226,000 ppb
-----		
22 - 40 gallon drums marked "AERO 412 Promoter." Generically, Alkyl dithiophosphate. pH = 13 (See MSDS).	Decomposition Products:	
	Hydrogen sulfide	N/A
	Carbon monoxide	N/A
-----		
4 - 55 gallon drums marked "AEROFLOAT 25 Promoter." Generically, Aryl dithiophosphoric acid. Reacts with water to form hydrogen sulfide (See MSDS).	Cresylic acid (cresol)	15 %
	Decomposition Products:	
	Hydrogen sulfide	N/A
	Carbon monoxide	N/A
-----		
3 - 55 gallon drums marked "DOWFROTH 250 Flootation Frother," (See MSDS).	Polypropylene glycol methyl ether	98 %
	Decomposition Products:	
	Carbon monoxide	N/A

#### 5.4 Conclusions

Hazardous constituents are present in each of the sources described above. Since each of these sources are essentially uncontained, these constituents appear to be available for potential release to surface water, ground water, and air, and subsequent off-site migration. Potential direct exposure to toxic and/or carcinogenic materials, by persons visiting the site, is also possible due to the open access of the site.

Several other potential sources of contamination may also be present, including: other uncharacterized tanks, containers, and impoundments, both partially full and full; soil near drums, tanks, and transformers; an on-site slag disposal and scrap iron pile; soil and partially full drums in a drum disposal area and disposal pit located in the southeast portion of the site; sediments



deposited behind the levee crossing the Big Wash, downstream of the site; and a potential underground storage tank<sup>18</sup>.

## 6.0 GROUND WATER PATHWAY

### 6.1 Hydrogeology

Unconsolidated alluvium and Quaternary lake sediments underlie the site to depths of approximately 480 feet, with the upper 110 feet being comprised of mostly sand and gravel, below which clay and gravel is encountered<sup>7</sup>.

The site is located in an area of ground water recharge for the Milford area aquifer<sup>7</sup>. In the valley to the east the aquifer can be divided into 3 interconnected high permeability layers separated by 3 low permeability layers. The March, 1972 depth to the water table at the site was 240 feet with an aquifer thickness of about 100 feet. Flow direction is east of southeast towards the town of Milford. Near the Beaver River, approximately 3 1/2 miles to the east, the flow changes towards a northeast direction<sup>7</sup>.

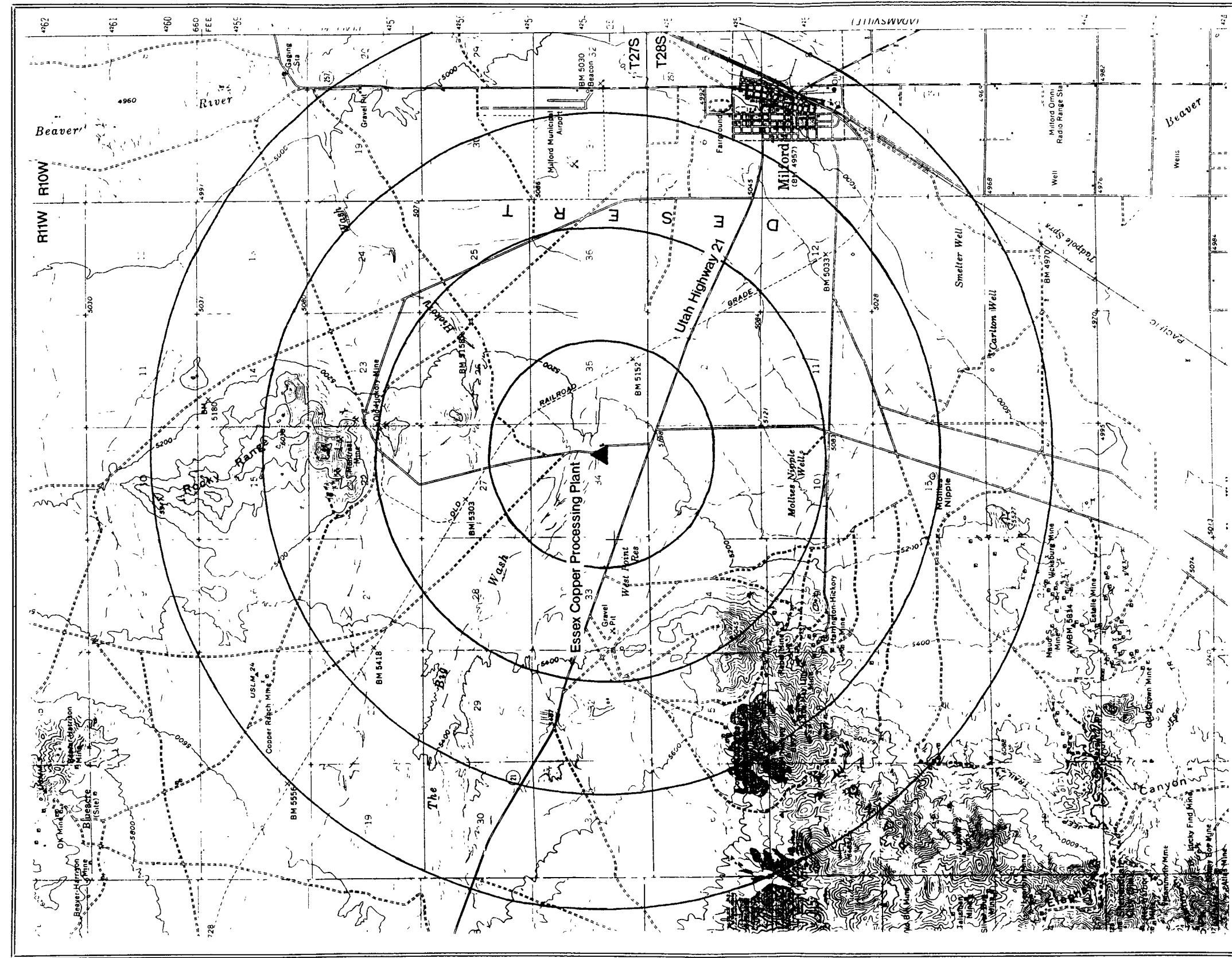
Subsurface inflow from The Big Wash drainage accounts for nearly 4% of the total inflow to the Milford area aquifer<sup>7</sup>. At the Essex Copper Site, The Big Wash flows through the tailings on the north side and has its overland flow terminated at a levee near the east edge of the site<sup>13,18</sup>. Here the water is ponded and allowed to percolate through sediments derived from the tailings area.

### 6.2 Targets

The town of Milford, with a 1990 population of 1107<sup>26</sup>, lies almost wholly between the 3 and 4 mile target distance limits from the site and is almost directly downgradient to the ground water flow. The town relies exclusively on ground water from the principal aquifer for their municipal supplies<sup>7</sup>. The nearest residences to the site include 3 homes which draw water from the aquifer for domestic purposes, and are located approximately one mile downgradient from the site<sup>18</sup>. A few rural residences are located in the area to the south and east of the site. Water from the aquifer also contributes heavily to irrigation and stockwater supplies<sup>7,24</sup>.

Within a 4 mile radius from the site, there are 42 wells, most of which are downgradient from the site; 7 of these are for municipal supply; 12 are used for domestic purposes; 24 are for irrigation, and 17 are for stock water<sup>24</sup>. Appendix K contains a map showing well locations and utilization, and printouts from the Utah Division of Water Rights and the Utah Division of Drinking Water. Note that some of these wells have multiple uses. Figure 8 shows a 4 mile radius from the site.

Figure 8



Large circles indicate 1, 2, 3 and 4 mile radii from site



UTAH DEPT. OF HEALTH		
Bureau of Solid and Hazardous Waste		
Four Mile Radius of Influence		
ESSEX COPPER PROCESSING PLANT		
BEAVER COUNTY, UTAH		
by	date	SCALE
JLK	11/29/89	1:62500

### 6.3 Sample Locations

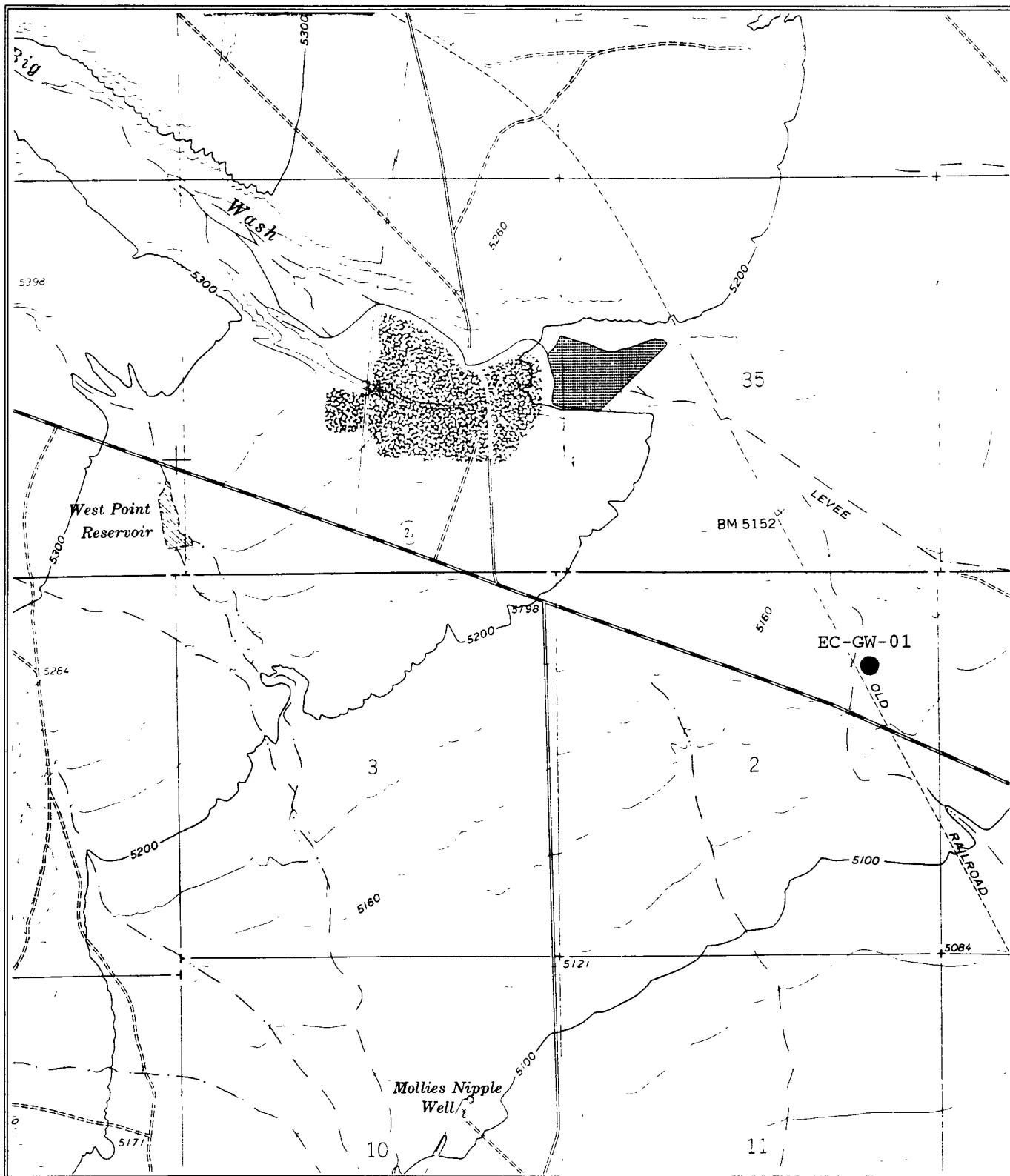
One of 3 domestic wells located near a cluster of residences 1 mile east of the site was sampled. Figure 9 shows the location of this well. Attachment L contains specific information regarding the well. Ground water sample EC-GW-01 was collected after purging approximately 286 gallons from the well. The well is screened from 224 to 304 feet below the ground surface<sup>23</sup>. The field parameters, pH, temperature, and specific conductivity, were tested during purging and immediately prior to sampling. The results of these are given on Table VII. The ground water sample was preserved with nitric acid, for the metals portion, and sodium hydroxide, for the cyanide portion.

**Table VII** Ground Water Field Measurements

<u>Time</u>	<u>Quantity Purged</u>	<u>Temperature</u>	<u>pH</u>	<u>Oxidation/ Reduction/ Potential</u>	<u>Specific Conductivity</u>
10:42	start pump				
10:47	18.7 gallons	23.3° C.	6.5	181 mV	1152 uS
10:54	66.3 gallons	22.4° C.	7.1	120 mV	1114 uS
11:02	116 gallons	23.0° C.	7.3	86 mV	1033 uS
11:10	202 gallons	21.3° C.	7.4	86 mV	1012 uS
11:10	collect sample EC-GW-01				

### 6.4 Analytical Results

Validated analytical results are included in Appendix D. No background sample was collected of ground water and therefore, the results must be evaluated on their own merit. No major contamination was detected based on the data received, however, results for antimony, arsenic, barium, chromium, lead, selenium and vanadium were rejected due to quality control considerations. Zinc concentrations in the sample, although not hazardous and probably not of concern, were greater than the geometric mean for surface water and ground water published by the Agency for Toxic Substances and Disease Registry<sup>11</sup> (ATSDR). No indication could be found in the ATSDR document as to what the geometric mean specifically accounts for.



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FIGURE 9  
GROUND WATER SAMPLE LOCATION

Source: USGS 7.5 min. topo. base

## 6.5 Conclusions

Resampling of the ground water downgradient of the Essex Copper site, especially for arsenic, chromium and lead, which are present at elevated concentrations on-site, is strongly warranted. The significance of the zinc in the ground water, mentioned above, is that zinc is also elevated in the source and may be an indicator for a potential ground water release.

Other constituents present in the on-site sources which may also be indicators of a release, in addition to zinc, and which were also not rejected, were not at significant concentrations in ground water. These constituents include calcium, iron, magnesium and sodium. Copper and silver, consistently present on-site, were not detectable in ground water.

A potential exists that hazardous materials originating at the Essex Copper Processing Facility have leached or are leaching into the principal aquifer of the Milford area. The Utah Bureau of Drinking Water and Sanitation is currently developing policy for the delineation of Wellhead Protection Areas (WHPA) and has indicated that the Essex site will likely be within the WHPA for the Milford aquifer<sup>16</sup>.

## 7.0 SURFACE WATER PATHWAY

### 7.1 Hydrology

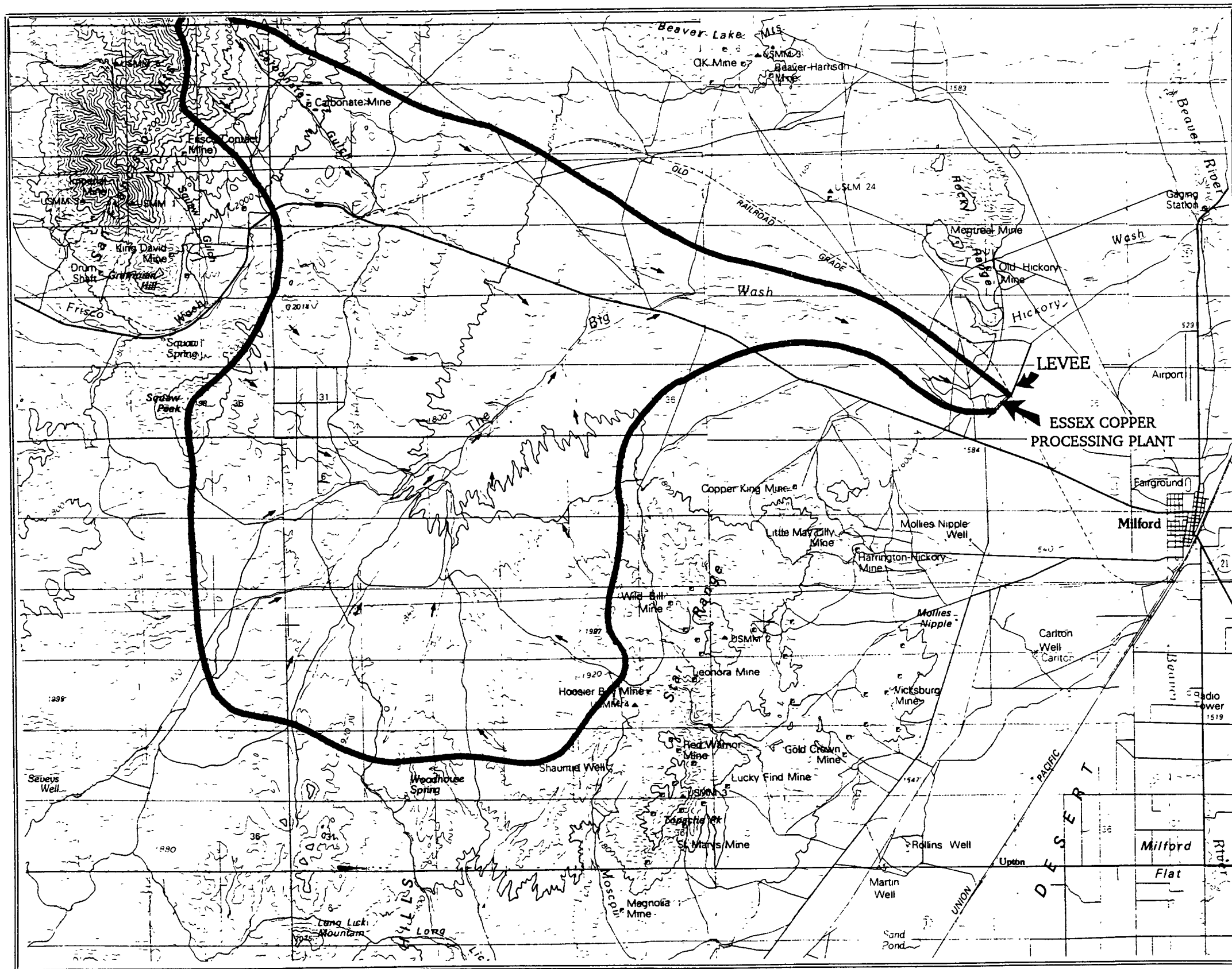
The Big Wash, which flows east through the northern portion of the site, drains an area to the west of the site, shown on Figure 10, in excess of 55 square miles<sup>15</sup>. It is ephemeral and flows only during periods of snowmelt or intense rain. A large levee extends north-south across the Big Wash, east of the site, which impounds all surface water from the drainage. The pond formed by this levee dries relatively quickly, indicating substantial percolation, and/or evaporation. Only during the most torrential precipitation events would potentially contaminated surface waters have even a remote possibility of migrating past the levee<sup>18</sup>.

Visual evidence is present to support an observation of contaminant migration to the Big Wash. Large gullies cut into the waste pile along the northeast portion of the site, and anomalous yellow-brown patches of sediment are present immediately downstream of the site in the Big Wash<sup>18</sup>.

Several evaporation ponds are present on-site. Blue colored standing water was observed in one of these ponds during an April, 1988 site visit. It appeared that the ponds had been lined in the past with a black plastic material. At the time of the DERR site visits, this lining was almost completely deteriorated. These ponds are discussed above as a source of hazardous materials.

### 7.2 Targets

Since surface water does not flow far from the site, no targets have been formally evaluated for this Site Inspection.



Arrows indicate stream flow direction.

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BUREAU OF ENVIRONMENTAL RESPONSE AND REMEDIATION		
Figure 10		
SURFACE WATER UPSTREAM DRAINAGE AREA		
Essex Copper Processing Plant Beaver County, Utah		
By	Date	Scale
JLK	9/19/90	1:100000

USGS Topo. Base. Wah Wah Mts.  
South. 30 x 60 minute series, metric.

### 7.3 Sample Locations

Four sediment samples were collected to evaluate whether contaminants have migrated off-site via surface water overland flow. Three of these were collected from the center of the Big Wash. The fourth was collected from the bank of a ditch leading from the mill to the Big Wash. Sample locations are shown on Figure 7. All sediment samples were collected from the surface with a stainless steel spoon. No water was present in the Big Wash at the time of sampling.

Sample EC-SE-01 was collected in the Big Wash approximately 300 feet west of the road forming the western site boundary, upstream of any potential surface water flow from the site, to determine background concentrations in sediment. The sample consisted of tan to brown sandy-silt.

Sample EC-SE-02 was collected from the east bank of a ditch leading northward from the mill area to the Big Wash, approximately 500 feet north of the mill. The sample consisted of reddish-brown very-fine-grained sand and silt. The bank material sampled appears to have been dredged from the ditch.

Sample EC-SE-03 was collected downstream of the site west of the levee. The sample consisted of light gray-brown sandy-silt, and was collected from a location which appeared to be representative of sediment "settled out" in the pond environment formed behind the levee.

Sample EC-SE-04 was collected at the most downstream probable point of contaminant entry from the tailings pile to the Big Wash, approximately 500 feet downstream from the northeast corner of the pile in the center of the channel. The sample consisted of yellow-brown fine sand and silt, and was collected from an area of anomolous yellow-brown sediments amidst naturally appearing light gray silt.

### 7.4 Analytical Results

Validated analytical results for the surface water pathway are summarized in Attachment F. The downstream sample, EC-SE-03, collected behind the Big Wash levee, exhibited the highest degree of contamination, with elevated arsenic, cadmium, copper, iron, silver and zinc, greater than 3 times that of respective background concentrations in sample EC-SE-01. Manganese was slightly elevated in this sample also.

Arsenic, copper and silver were elevated greater than 3 times that of respective background concentrations, in the yellow-brown soil collected for sample EC-SE-04, at the probable point of entry. However, the arsenic value, and the silver in the background sample, were qualified as "estimated" due to quality control considerations.

The sample collected from the mill ditch, EC-SE-02, exhibited arsenic and iron concentrations greater than 3 times background. The arsenic value was qualified as an estimate.

## 7.5 Conclusions

Analytical results for the sediment samples indicate that contamination is migrating by surface water from the site to the impoundment behind the Big Wash levee. However, the potential surface water exposure presents a low direct threat to human health or the environment due to the short distance of off-site contaminant migration, and the lack of targets within this distance. Potential spread of contamination from surface water to ground water resulting from percolation of the ponded water behind the levee appears to be a greater concern.

## 8.0 SOIL EXPOSURE AND AIR PATHWAYS

No direct sampling was conducted for the air and soil exposure pathways due to a relatively low significance of these pathways with regard to the Hazard Ranking System of the NCP, resulting from low human and environmental targets in close proximity to the site. The site is somewhat isolated, with the nearest residence being about one mile east<sup>13,18</sup>. Although of low significance for potential scoring purposes, these pathways are still of major concern due to: 1) a very high likelihood of contaminant release to the air pathway and the resultant spread of contaminated soil, coupled with the potential for the contamination in soil to migrate to other pathways; and 2) high toxicity of on-site contaminants and the potential for direct exposure associated with occasional recreation use of the site.

Release of contaminants to the air is also a concern at the Essex site. Dust and other materials from the site have been observed blowing off the site on several occasions<sup>18</sup>. Various aeolean erosion, transport and deposition structures are apparent on and off-site, including: blowout depressions, wind ripples, and dune structures evident on-site; and a very large aeolean "plume" extending north of the site evident on aerial photography of the site<sup>10</sup>, and confirmed by the collection of soil sample EC-SO-09 (Appendix F).

Direct exposure to on-site contaminants may also present a significant threat. Materials in drums, tanks and other containers, including transformers, are toxic, reactive, and/or carcinogenic<sup>1,4,27</sup>. In addition, several potential sources have not been adequately evaluated, and several physical hazards are also present. Access to the site is unrestricted except for a cable which crosses the main entrance. Vandalism of the structures and evidence of off-road-vehicle use were apparent during DERR site visits.

## 9.0 SUMMARY AND CONCLUSIONS

The Essex Copper site, located approximately 3 miles northwest of Milford, Utah along the north side of State Highway 21, is an abandoned ore processing facility with several acres of ore/tailings material, pond impoundments, drums, tanks and other containers, and contaminated soil. A large portion of the process supplies and machinery appear to have been left in place at the cease of operations. The site is in the northern portion of the Escalante Desert in a fairly remote semi-arid area in the western portion of south-central Utah.



Hazardous constituents are present in several on-site sources, all of which are essentially uncontained. Constituents from these sources appear to be available for potential release to surface water, ground water, and air. Potential direct exposure to toxic and/or carcinogenic materials, by persons visiting the site, is also possible due to the open access of the site.

Analytical results from sampling conducted in June, 1992, reveals elevated concentrations of several heavy metals in the ore/tailings material, as compared to background soil concentrations. The most notable, and consistently elevated constituents were copper, up to 16,500 ppm, silver, 32.9 ppm, and arsenic, 363 ppm. Corrosive and/or toxic materials are also present in on-site drums and tanks.

A potential exists that hazardous materials originating at the Essex Copper Processing Facility have leached or are leaching into the principal aquifer of the Milford area. One ground water sample was collected from a domestic well located approximately 1 mile downgradient of the site. Analytical results from this sample did not indicate contamination, but values for several analytes were rejected due to quality control considerations. Re-sampling of ground water may be warranted. The Milford Area Aquifer, underlying the site, is the sole source of potable water for the town of Milford, and vicinity.

The Big Wash drainage is located adjacent to the north edge of the ore/tailings piles. Analytical results for the sediment samples indicate that contamination is migrating by surface water from the site to an impoundment formed behind a levee in the Big Wash less than 1000 feet downstream of the site. However, the potential surface water exposure presents a low direct threat to human health or the environment due to the short distance of off-site contaminant migration, and the lack of targets within this distance. Potential spread of contamination from surface water to ground water resulting from percolation of the ponded water behind the levee appears to be a greater concern.

Release of contaminants to the air is also a concern at the Essex site. Dust and other materials from the site have been observed blowing off the site on several occasions. Various aeolian erosion, transport and deposition structures are apparent on and off-site, including: blowout depressions, wind ripples, and dune structures, evident on-site; and a very large aeolian "plume" extending north of the site, evident on aerial photography of the site.

Direct exposure to on-site contaminants may also present a significant threat. Materials in drums, tanks and other containers, including transformers, are toxic, reactive, and/or carcinogenic. In addition, several potential sources have not been adequately evaluated, and several physical hazards are also present. Access to the site is unrestricted except for a cable which crosses the main entrance. Vandalism of the structures and evidence of off-road-vehicle use were apparent during DERR site visits.

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20. Utah Department of Environmental Quality, Division of Environmental Response and Remediation. December, 1989. Preliminary Assessment of a Potential Hazardous Waste Site, Essex Copper Processing Plant, Beaver County, Utah.
21. Utah Department of Environmental Quality, Division of Environmental Response and Remediation. November, 1989. Quality Assurance Project Plan.
22. Utah Department of Environmental Quality, Division of Environmental Response and Remediation. April, 1988. Site Visit Report.
23. Utah Department of Natural Resources, Division of Water Rights. File review - File # 71 3785.
24. Utah Department of Natural Resources, Division of Water Rights. May, 1989. Water Rights Point of Diversion Printout.
25. Utah Office of Planning and Budget, State Data Center. July, 1991. Utah Data Guide. Volume 10, Number 3. Table 2, 1980 and 1990 Population, Households and Housing Units by County.

26. Utah Office of Planning and Budget, State Data Center. January, 1991. Utah Data Guide. Volume 10, Number 1. Table 2, Utah Population by County and City, 1990 Final Census Counts.
27. Utah State Health Laboratory. July, 1992. Analytical results for oil samples collected from the Essex Copper Processing Plant, June 3, 1992.
28. Versar Architects and Engineers, Inc. October, 1992. Draft Letter Report, Essex Copper Data Validation, Inorganic Analysis, EPA Case #18254.
29. Whelan, J. A.. November, 1982. Utah Geological and Mineral Survey. Special Studies #57, Geology, Ore Deposits and Mineralogy of the Rocky Range, Near Milford, Beaver County, Utah.
30. Whitman, Wayne. June, 1992. Personal communication regarding the off-site utilization of gravel from the Essex Copper Processing Plant.

Appendix A.  
Site Inspection Data Summary

## SITE INSPECTION DATA SUMMARY

Site Name: ESSEX COPPER PROCESSING PLANT EPA Region: 8 Date: 3/12/93  
State Office or Contractor Name and Address: UTAH DEQ - DERR, 150 NORTH 1950 WEST,  
SALT LAKE CITY, UTAH 84116

## GENERAL SITE INFORMATION

1. CERCLIS ID Number: UTD988066064  
Address: 3 MILES WEST OF MILFORD City: MILFORD  
County: BEAVER State: UT Zip Code: 84751 Cong. Dist.: 01
2. Owner Name: ANYOX METALS, LTD.  
Owner Address: 150 YORK STREET, SUITE 1614 City: TORONTO, ONTARIO State:   
Operator Name: ESSEX INTERNATIONAL, INC.  
Operator Address: UNKNOWN City:  State:
3. Type of Ownership (check all that apply):  
☒ Private ☐ Municipal ☒ County ☐ State  
☐ Federal/Agency Name:  Other:   
References: 2, 3, 9, 20
4. Approximate size of Property: 147 acres. References: 3
5. Latitude: 38° 25' 03.0 "  
Longitude: 113° 04' 08.0 " References: 20
6. Status: ☐ Active ☒ Inactive ☐ Unknown References: 18, 20, 22
7. Years of Operation: From: 1960 To: 1974 References: 29
8. Previous Investigations:

<u>TYPE</u>	<u>AGENCY/STATE/CONTRACTOR</u>	<u>DATE</u>	
<u>SITE VISIT</u>	<u>UTAH DERR</u>	<u>4/27/88</u>	References: <u>22</u>
<u>PA</u>	<u>UTAH DERR</u>	<u>12/5/89</u>	References: <u>20</u>
<u></u>	<u></u>	<u></u>	References: <u></u>
<u></u>	<u></u>	<u></u>	References: <u></u>
<u></u>	<u></u>	<u></u>	References: <u></u>
<u></u>	<u></u>	<u></u>	References: <u></u>
<u></u>	<u></u>	<u></u>	References: <u></u>

## WASTE SOURCE INFORMATION

1. **Waste source types** (check all that apply):

☐ Constituent ☐ Wastestream (type): \_\_\_\_\_  
☐ Landfill ☒ Tanks or non-drum containers (type): TANKS  
☒ Drums ☒ Pile (type): MINING WASTE  
☒ Contaminated Soil ☒ Surface Impoundment  
☐ Land Treatment ☐ Surface Impoundment (backfilled)  
☒ Other: ELECTRICAL TRANSFORMERS

References: 18, 20, 22

2. **Types of wastes** (check all that apply):

☒ Organic Chemicals ☒ Inorganic Chemicals ☐ Municipal Wastes  
☐ Pesticides/Herbicides ☒ Metals ☐ Solvents  
☐ Radionuclides ☐ Other: \_\_\_\_\_

References: 1, 4, 27, 28

3. **Summarize history of waste disposal operations:**

THE SITE FIRST CAME INTO PRIVATE OWNERSHIP AS A PATENT BY THE BIRCH RANCH AND OIL COMPANY AND HAS UNDERGONE SEVERAL CHANGES IN TITLE. A 350 TON/DAY FLOATION MILL, APPARENTLY THE ON-SITE FACILITY, WAS RENOVATED IN 1960 FOR THE PROCESSING OF COPPER ORE FROM THE ROCKY RANGE. MINING OPERATIONS CEASED AT THE SITE IN 1974 AND THE SITE WAS ABANDONED. AERIAL PHOTOGRAPHS OF THE SITE FROM 1967 AND 1978 SHOW A SUBSTANTIAL INCREASE, ALMOST 2-FOLD, IN THE AREA OF THE WASTE PILE. THE WASTE PILE COVERS APPROXIMATELY 64 ACRES. SURFACE IMPOUNDMENTS HAVE BEEN CONSTRUCTED OVER 9 OF THE 64 ACRES OF THE WASTE PILE. SEVERAL DRUMS, TANKS, AND OTHER CONTAINERS WERE LEFT ON-SITE WHEN THE SITE WAS ABANDONED, MANY OF WHICH ARE FULL, PARTIALLY FULL, BULGED, CORRODED, AND/OR LEAKING. SEVERAL ELECTRICAL TRANSFORMERS AND CAPACITORS WERE LEFT ON-SITE, MANY SHOWING SIGNS OF LEAKAGE.

References: 10, 18, 29

4. Source characterization (Attach pages to show quantity and calculations):

Source 1 name: ORE/TAILINGS PILE Source Type: PILE

Describe Source: ORE AND/OR TAILINGS PILE OF UNDETERMINED DEPTH

Ground water migration containment: NO CONTAINMENT

Surface water migration containment: NO CONTAINMENT

Air migration (gas and migration) containment: NO CONTAINMENT - OBSERVED RELEASE

Physical State of Wastes:

☒ Solid ☐ Liquid ☐ Sludge/Slurry ☐ Gas ☐ Unknown

Constituent Quantity of Hazardous Substances: \_\_\_\_\_ (specify units).

Wastestream Quantity Containing Hazardous Substances: \_\_\_\_\_ (specify units).

Volume of Source (yd<sup>3</sup>): \_\_\_\_\_ Area of Source (ft<sup>2</sup>): 2,800,000

Hazardous substances associated with source 1:

ARSENIC 363 PPM MAGNESIUM 25,900 PPM \_\_\_\_\_

CHROMIUM 111 PPM SILVER 32.9 PPM \_\_\_\_\_

COPPER 16,500 PPM ZINC 449 PPM \_\_\_\_\_

References: 18, 28

Source 2 name: LEACHATE PONDS Source Type: IMPDMT

Describe Source: SEVERAL PONDS COVER 9 ACRES OF THE PILE

Ground water migration containment: NO CONTAINMENT - DETERIORATED LINING

Surface water migration containment: NO CONTAINMENT

Air migration (gas and migration) containment: NO CONTAINMENT

Physical State of Wastes:

☒ Solid ☒ Liquid ☐ Sludge/Slurry ☐ Gas ☐ Unknown

Constituent Quantity of Hazardous Substances: \_\_\_\_\_ (specify units).

Wastestream Quantity Containing Hazardous Substances: \_\_\_\_\_ (specify units).

Volume of Source (yd<sup>3</sup>): \_\_\_\_\_ Area of Source (ft<sup>2</sup>): 375,000

Hazardous substances associated with source 2:

ALUMINUM 1,140,000 ug/L COPPER 10,100,000 ug/L TALLIUM 11.1 ug/L

CADMIUM 713 ug/L MANGANESE 430,000 ug/L ZINC 75,600 ug/L

COBALT 6360 ug/L NICKEL 5490 ug/L \_\_\_\_\_

References: 18, 28



Source 3 name: DRUMS Source Type: DRUMS  
 Describe Source: SEVERAL 55 AND 40 GALLON DRUMS  
 Ground water migration containment: NO CONTAINMENT  
 Surface water migration containment: NO CONTAINMENT  
 Air migration (gas and migration) containment: NO CONTAINMENT  
 Physical State of Wastes:  
X Solid X Liquid X Sludge/Slurry      Gas      Unknown  
 Constituent Quantity of Hazardous Substances: 2530 GALLONS (specify units).  
 Wastestream Quantity Containing Hazardous Substances: 2695 GAL (specify units).  
 Volume of Source (yd<sup>3</sup>):                      Area of Source (ft<sup>2</sup>):                       
 Hazardous substances associated with source 3:  
BENZOIC ACID 2-METHYLNAPHTHALENE ALKYL DITHIOPHOSPHATE  
4-CHLORO-3-METHYL PHENOL CRESOL ARYL DITHIOPHOSPHORIC ACID  
2, 4-DINITROPHENOL PHENOL POLYPROPYLENE GLYCOL METHYL ETHER  
 References: 1, 4, 18, 27

Source 4 name: TRANSFORMERS Source Type: TANKS  
 Describe Source: SEVERAL ELECTRICAL TRANSFORMERS  
 Ground water migration containment: NO CONTAINMENT  
 Surface water migration containment: NO CONTAINMENT  
 Air migration (gas and migration) containment: NO CONTAINMENT  
 Physical State of Wastes:  
     Solid X Liquid      Sludge/Slurry      Gas      Unknown  
 Constituent Quantity of Hazardous Substances: UNKNOWN (specify units).  
 Wastestream Quantity Containing Hazardous Substances: 2340 GAL (specify units).  
 Volume of Source (yd<sup>3</sup>):                      Area of Source (ft<sup>2</sup>):                       
 Hazardous substances associated with source 4:  
AROCLOR 1260 - 1900 PPM                                            
                                                                                
                                                                                
 References: 18, 27

Source 5 name: CONTAMINATED SOIL Source Type: SOILS

Describe Source: AEOLEAN DEPOSITED SOIL NORTH OF THE EAST TAILINGS PILE

Ground water migration containment: NO CONTAINMENT

Surface water migration containment: NO CONTAINMENT

Air migration (gas and migration) containment: NO CONTAINMENT

Physical State of Wastes:

X Solid       Liquid       Sludge/Slurry       Gas       Unknown

Constituent Quantity of Hazardous Substances: UNKNOWN (specify units).

Wastestream Quantity Containing Hazardous Substances:            (specify units).

Volume of Source (yd<sup>3</sup>):                      Area of Source (ft<sup>2</sup>):                     

Hazardous substances associated with source 5:

ARSENIC 71.8 PPM                      ZINC 272 PPM                                          

COPPER 3880 PPM                                                                                    

LEAD 141 PPM                                                                                    

References: 18, 28

5. Description of removal or remedial activities:

If Removal has occurred, identify the removal authority and describe the activities. Specify the date(s) of the removal.

NO REMOVAL OR REMEDIAL ACTIVITIES HAVE OCCURRED TO DATE.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

References: \_\_\_\_\_

## GROUND WATER INFORMATION

### 1. Ground water drinking water use within 4 miles of site sources:

☐ Municipal ☐ Private ☒ Both ☐ No Drinking Water Use

References: 17, 24

### 2. Is ground water contaminated?

☐ Yes ☐ No ☒ Uncertain but likely ☐ Uncertain but not likely  
☒ Additional sampling required

Is analytical evidence available? ☒ Yes ☐ No References: 18, 28

### 3. Is ground water contamination attributable to the site?

☐ Yes ☐ No ☒ Additional sampling required References: 18, 28

CONTAMINATED SURFACE WATER IS PONDED NEAR THE SITE AND ALLOWED TO PERCOLATE  
THROUGH THE GROUND. NO MONITORING WELLS ARE PRESENT. A NEARBY DOMESTIC WELL  
WAS SAMPLED AND SHOWS NO SIGN OF CONTAMINATION, HOWEVER, A SIGNIFICANT PORTION  
OF THE DATA WAS REJECTED.

### 4. Are drinking water wells contaminated?

☐ Yes ☐ No ☐ Uncertain but likely ☒ Uncertain but not likely  
☒ Additional sampling required

Is analytical evidence available? ☒ Yes ☐ No References: 18, 28

5. Net precipitation (HRS Section 3.1.2.2): 0.43 inches.

### 6. County average number of persons per residence:

2.95 people. References: 25

7. Discuss general stratigraphy underlying the site. Attach sketch of stratigraphic column.

UNCONSOLIDATED ALLUVIAL AND QUATERNARY LACUSTRAL DEPOSITS UNDERLIE THE SITE TO  
DEPTHS OF APPROXIMATELY 480 FEET, WITH THE UPPER 110 FEET BEING COMPRISED MOSTLY  
OF SAND AND GRAVEL. SKETCHES OF THE STRATIGRAPHIC COLUMN, BASED ON DATA FROM  
WELL LOGS FOR 2 ON-SITE WELLS, ARE ATTACHED. DEPTH TO GROUND WATER IS  
APPROXIMATELY 280 FEET.

References: 7

8. Using Table GW-1, summarize geology underlying the site (starting with formation #1 closest to ground surface). Indicate if formation is interconnected with overlying formation.

TABLE GW-1: SITE GEOLOGY

NAME OF FORMATION	INTER-CONNECT? (yes/no)	TYPE OF MATERIAL	AVERAGE THICKNESS (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	USED FOR DRINKING WATER?
1. UNCONSOLIDATED		SND, GVL	>100	3.5E-2	YES
2.					
3.					
4.					
5.					

References: 7

9. Does a karst aquifer underlie any site source?

     Yes        X   No

References: 7

10. Depth to top of aquifer: 240 feet

Elevation: 4960 feet

References: 7

11. In the table below, enter the number of people obtaining drinking water from wells located within 4 miles of the site. For each aquifer, attach population calculation sheets. Key aquifer to formations listed in Table GW-1.

POPULATION SERVED BY WELLS WITHIN DISTANCE CATEGORIES BY AQUIFER

DISTANCE OF WELL(S) FROM SITE SOURCES	AQUIFER A: INCLUDES FORMATIONS <u>1</u>	AQUIFER B: INCLUDES FORMATIONS <u>        </u>	AQUIFER C: INCLUDES FORMATIONS <u>        </u>
¼ mile or less	0		
>¼ to ½ mile	3		
>½ to 1 mile	9		
>1 to 2 miles	0		
>2 to 3 miles	0		
>3 to 4 miles	1107		

References: 24, 26

12. Is ground water from multiple wells blended prior to distribution?

     Yes        N/A   No

References: 24

13. Is ground water blended with surface water?

     Yes        N/A   No

References: 24

Briefly Describe: GROUND WATER FROM THE MILFORD AREA AQUIFER IS THE SOLE SOURCE OF CULINARY WATER IN THE AREA.

**14.Distance from any incompletely contained source available to ground water to nearest drinking water well (HRS Section 3.3.1):**

4100 feet

References: 24, 13

**15.Briefly describe standby drinking water wells within 4 miles of sources at the site:**

ALL MUNICIPAL WELLS SERVING THE TOWN OF MILFORD ARE LOCATED BETWEEN 3 AND 4 MILES FROM THE SITE. INDIVIDUAL DISCUSSION OF STANDBY WELLS IS IRRELEVANT.

References: 24

**16.Ground water resources within 4 miles of site sources (HRS Section 3.3.3):**

X Irrigation (5-acre minimum) of commercial food or commercial forage crops.

X Commercial livestock watering.

   Ingredient in commercial food preparation.

   Supply for commercial aquaculture.

   Supply for major or designated water recreation area, excluding drinking water use.

   Water usable for drinking water but no drinking water wells are within 4 miles.

   None of the above.

References: 7, 17, 24

**18.Wellhead protection area (WHPA) within 4 miles of site sources (HRS Section 3.3.4):**

   Source with non-zero containment factor value lies within or above the WHPA.

   Observed ground water contamination attributable to site source(s) lies within the WHPA.

   WHPA lies within 4 miles of site sources.

X None

References: 16

**Additional ground water pathway description:**

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References: \_\_\_\_\_

## SURFACE WATER INFORMATION

COMPLETE A COPY OF THIS SECTION OF THE DATA SUMMARY FOR EACH WATERSHED

1. Describe the surface water migration path from site sources to at least 15 miles downstream. Attach a sketch of the surface water migration route.

SURFACE WATER FLOWS FROM THE SITE TO THE BIG WASH, AN EPHEMERAL STREAM IN WHICH THE NORTH SIDE OF THE SITE IS LOCATED. ALL WATER IN THE BIG WASH IS IMPOUNDED LESS THAN 1,000 FEET DOWNSTREAM.

References: 10, 13, 18

### 2. Is Surface Water Contaminated?

☒ Yes    ☐ No    ☐ Uncertain but likely    ☐ Uncertain but not likely  
☐ Additional sampling is required

Is analytical evidence available? ☒ Yes    ☐ No    References: 28

### 3. Is surface water contamination attributable to the site?

☒ Yes    ☐ No    ☐ Additional sampling required    References: 28

### 4. Floodplain category in which site sources are located (check all that apply):

☒ 1-year    ☒ 10-year    ☒ 100-year    ☒ 500-year    ☐ None    References: 18, BEST PROFESSIONAL JUDGEMENT

### 5. Describe flood containment for each source (HRS Section 4.1.2.1.2.2):

Source #1	<u>ORE/TAILINGS</u>	Flood Containment	<u>NO CONTAINMENT</u>
Source #2	<u>EVAP. PONDS</u>	Flood Containment	<u>NO CONTAINMENT</u>
Source #3	<u>DRUMS</u>	Flood Containment	<u>NO CONTAINMENT</u>
Source #4	<u>TRANSFORMERS</u>	Flood Containment	<u>NO CONTAINMENT</u>
Source #5	<u>SOIL CONTAM.</u>	Flood Containment	<u>NO CONTAINMENT</u>

References: 18

### 6. Shortest overland distance to surface water from any source (HRS Section 4.1.2.1.2.1.3):

0 feet    References: 10, 13, 18

### 7. Size of drainage area (HRS Section 4.4.3):

2.4E6 acres    References: 15

### 8. Describe the predominant soil group within the drainage area (HRS Section 4.1.2.1.2.1.2):

COARSE TO MEDIUM TEXTURED SOILS; SILT, SAND AND GRAVEL; ARE PRESENT ON-SITE

References: 18

References: 5

References: 7, 13

References: 7

References: \_\_\_\_\_

13. Identify all drinking water intakes, fisheries, and sensitive environments within 15 miles downstream.

[illegible]

\* If target is a drinking water intake, provide number of people served by intake. If target is a fishery, provide species and annual production of human food chain organisms (pounds per year). If target is a wetland, specify wetland frontage (in miles). Attach calculation pages.

References: \_\_\_\_\_

References: \_\_\_\_\_

NO SURFACE WATER TARGETS HAVE BEEN IDENTIFIED FOR THIS INVESTIGATION.



15. Describe any standby drinking water intakes within 15 miles downstream:

NO SURFACE WATER TARGETS HAVE BEEN IDENTIFIED.

References: \_\_\_\_\_

16. Surface water resources within 15 miles downstream (HRS Section 4.1.2.3.3):

☐ Irrigation (5 acres minimum) of commercial food or commercial forage crops

☐ Commercial livestock watering

☐ Ingredient in commercial food preparation

☐ Major or designated water recreation area, excluding drinking water use

☐ Water designated by the state for drinking water use but is not currently used

☐ Water usable for drinking water but no drinking water intakes within 15 miles downstream

☒ None of the above

References: \_\_\_\_\_

## SOIL EVALUATION

### 1. Is surficial or soil contamination present at the site?

☒ Yes    ☐ No    ☐ Uncertain but likely    ☐ Uncertain but not likely  
☐ Additional sampling required

Is analytical evidence available? ☒ Yes    ☐ No    References: AR

### 2. Is surficial or soil contamination attributable to the site?

☒ Yes    ☐ No    ☐ Additional Sampling Required

### 3. Is surficial contamination on the property and within 200 feet of a residence, school, daycare center, or workplace?

☐ Yes    ☒ No    ☐ Uncertain but likely    ☐ Uncertain but not likely  
☐ Additional sampling required

Is analytical evidence available? ☐ Yes    ☐ No    References: \_\_\_\_\_

### 4. Total area of surficial contamination (HRS Section 5.2.1.2):

\_\_\_\_\_ square feet    References: \_\_\_\_\_

### 5. Attractiveness/accessibility of the areas of observed contamination (HRS Section 5.2.1.1). Check all that apply:

☐ Designated recreational area  
☐ Used regularly, or accessible and unique recreational area  
☒ Moderately accessible with some use  
☐ Slightly accessible with some use  
☐ Accessible with no use  
☐ Inaccessible with some use  
☐ Inaccessible with no use

References: 18

### 6. Population within 1-mile travel distance from site.

DISTANCE FROM SITE SOURCES	POPULATION
¼ mile or less	0
>¼ to ½ mile	0
>½ to 1 mile	12

References: 13, 25

## AIR INFORMATION

### 1. Is air contamination present at the site?

☒ Yes    ☐ No    ☐ Uncertain but likely    ☐ Uncertain but not likely  
☐ Additional sampling required

Is analytical evidence available? ☐ Yes ☒ No    References: 18

### 2. Is air contamination attributable to the site?

☒ Yes    ☐ No    ☐ Additional sampling required

### 3. Are populations, sensitive environments, or wetlands exposed to airborne hazardous substances released from the site?

☐ Yes    ☐ No    ☐ Uncertain but likely    ☒ Uncertain but not likely  
☐ Additional sampling required

Is analytical evidence available? ☐ Yes ☒ No    References: \_\_\_\_\_

### 4. Evidence of biogas release from any of the following source types at the site:

☐ Below-ground containers or tanks    ☐ Landfill  
☐ Buried surface impoundment    References: \_\_\_\_\_

5. Particulate migration potential factor value: 17 (HRS Figure 6-2)

6. Particulate mobility factor value: .002 (HRS Figure 6-3)

### 7. Distance from any incompletely contained source to nearest residence or regularly occupied area:

0.75 miles    References: 13

### 8. Population within 4 miles of site sources.

DISTANCE FROM SITE SOURCES	POPULATION
0 (within sources)	0
¼ mile or less	0
>¼ to ½ mile	0
>½ to 1 mile	12
>1 to 2 miles	0
>2 to 3 miles	0
>3 to 4 miles	1107

References: 13, 18, 24, 26

**9.Resources within ¼ mile of site sources (HRS Section 6.3.3):**

- ☐ Commercial agriculture  
☐ Commercial silviculture  
☐ Major or designated recreation area  
☒ None of the above

References: \_\_\_\_\_

**10.Sensitive environments and wetlands within 4 miles of the site:**

NAME/DESCRIPTION/LOCATION OF SENSITIVE ENVIRONMENT OR WETLAND	DISTANCE FROM SITE (MILES)	TYPE OF SENSITIVE ENVIRONMENT	WETLAND SIZE (ACRES)

References: \_\_\_\_\_

## This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

## LIST OF REFERENCES

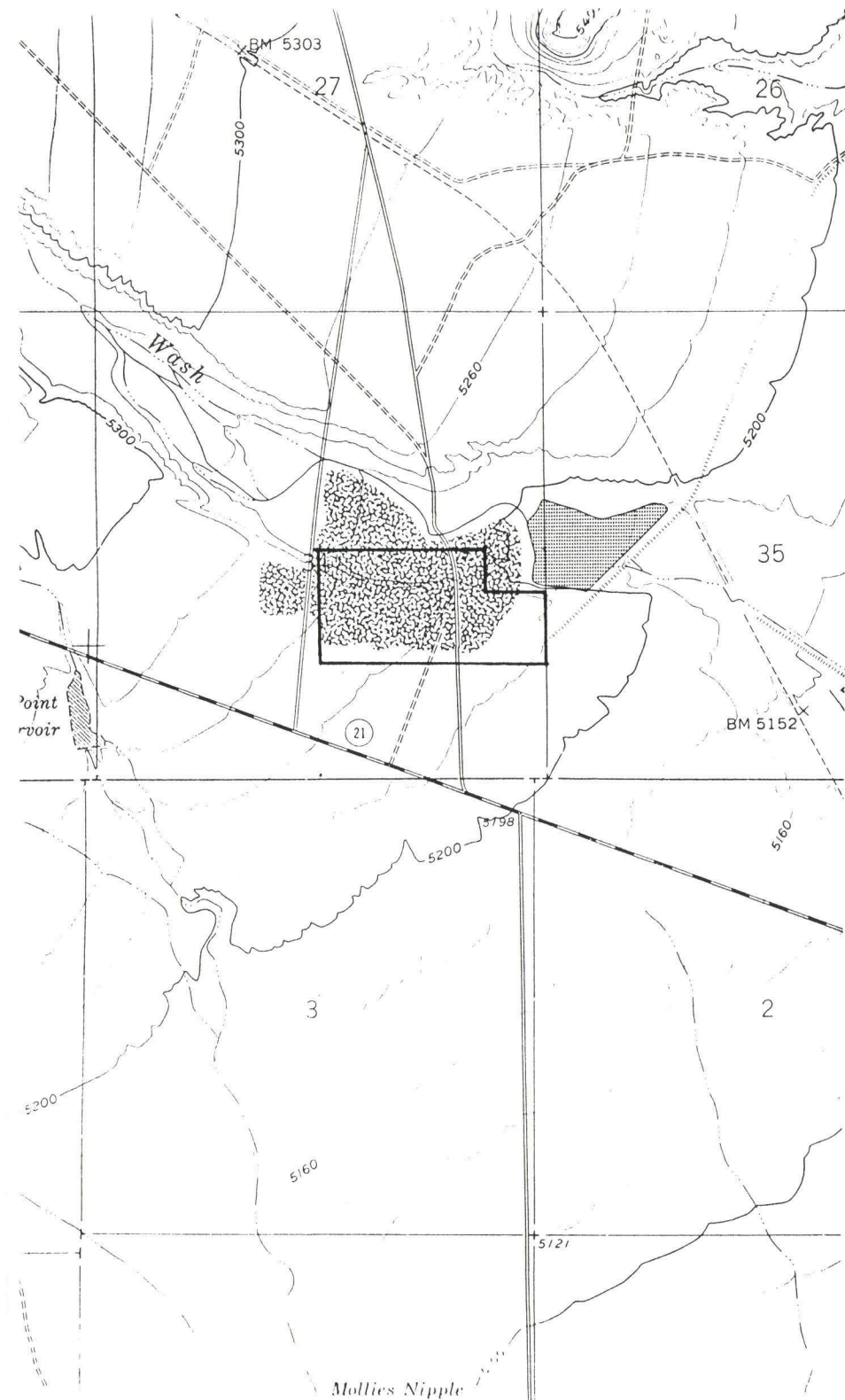
1. American Cyanamid Company. Material Safety Data Sheets for products AERO® 412 Promoter, Aqueous, and AEROFLOAT® 25 Promoter.
2. Beaver County Recorder's Office. August, 1992. Beaver County Index, No. 2645, property boundary description.
3. Beaver County Recorder's Office. May, 1989. Telephone communication with Bruce Brown, County Recorder.
4. Dow Chemical Company. December, 1992. Material Safety Data Sheet for product DOWFROTH® 250 Floatation Frother.
5. Eubank, Mark. 1979. Utah Weather.
6. Johnson, Bene, caretaker. May, 1989. Personal communication.
7. Mower, R. W. and R. M. Cordova. 1974. Water Resources of the Milford Area with Emphasis on Ground Water. Utah Department of Natural Resources, Division of Water Resources. Technical Publication #43,
8. Stevens, Dale J., R. Clayton Brough, Rodney D. Griffin, E. Arlo Richardson. 1983. Utah Weather Guide.
9. The Shield Development Company, Ltd. 1992. Telephone communications with Pat Sheridan, owner, and representative for Anyox Metals, Ltd. (416) 363-4477. 150 York Street, Suite 1614, Toronto, Ontario, M5H3S5.
10. United States Department of Agriculture, Agricultural Stabilization and Conservation Service. September, 1967 and October, 1978. Aerial Photographs, Roll #'s DRZ-1HH and 40 49001 178, respectively.
11. United States Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. February, 1993. Draft Toxicological Profile for Zinc. page 81.
12. United States Environmental Protection Agency. September, 1992. Interim Final Guidance for Performing Site Inspections Under CERCLA.
13. United States Geological Survey. 1978. Milford, Utah, 7.5 Minute Topographic Quadrangle.
14. United States Geological Survey. 1958. Milford, Utah, 15 Minute Topographic Quadrangle.

15. United States Geological Survey. 1980. Wah Wah Mountains, South, Utah, 30 by 60 Minute Topographic Quadrangle, Metric.
16. Utah Department of Environmental Quality, Division of Drinking Water. June, 1989. Personal Communication with Gayle Smith, Director.
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18. Utah Department of Environmental Quality, Division of Environmental Response and Remediation. June, 1992. Focused Site Inspection field observations.
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29. Whelan, J. A.. November, 1982. Utah Geological and Mineral Survey. Special Studies #57, Geology, Ore Deposits and Mineralogy of the Rocky Range, Near Milford, Beaver County, Utah.
30. Whitman, Wayne. June, 1992. Personal communication regarding the off-site utilization of gravel from the Essex Copper Processing Plant.



**Appendix B.**  
**Beaver County Recorder, Anyox Property**



## BEAVER COUNTY INDEX

No. 2645

ASSESSMENT DIST. Beaver CO.

	INSTRUMENT	DEED REFERENCE	
		BOOK	PAGE
<del>Sheld Development Co.</del>	#7 King ST. E. SUITE 14	145	40
ANYOK METALS LTD	TORONTO, CANADA, M-5C11	207	16

LOT \_\_\_\_\_ BLOCK \_\_\_\_\_ PLAT \_\_\_\_\_

SEC. \_\_\_\_\_ TNP. \_\_\_\_\_ RG. \_\_\_\_\_

ACREAGE 72.7

### DESCRIPTION

Beg. NW cor SE $\frac{1}{4}$  sec. 34, T27S, R11W, th. E. 1980 ft.; S. 500 ft.; E. 660 ft.; S. 820 ft.; W. 2640 ft.; N. 1320 ft. to beg.

Boundaries

**Appendix C.**  
**Site Photographs**

## ESSEX COPPER SITE INSPECTION

### PHOTOGRAPHIC LOG

June 2 & 3, 1992

1. View northeast to sample collection for EC-SO-01, background.
2. View southwest to sample location EC-SO-02.
3. View north to large gully eroding through pile north of sample location EC-SO-02.
4. View west from top of pile in west portion of site.
5. View east to depression at base of west hill, and sample location for EC-SO-03.
6. View east to sample collection for EC-SO-03, composited from 3 locations in photo: light soil at left, alkali at center, and dark soil at right.
7. View east of northeast to apparent gravel excavation area and sample location EC-SO-04.
8. View northwest to sample collection for EC-SO-04.
9. View northwest to sample collection for EC-SO-05.
10. View east of southeast to sample collection for EC-SO-06.
11. View west of southwest toward mill area. Sample location EC-SO-06 at right center.
12. View west of northwest to sample location EC-SO-07.
13. View north to sample location EC-SO-07 in upper left. Note "blowout" soil surface characteristic.
14. View southwest to sample location EC-SO-08.
15. Label on one of three transformers located on pad at northwest corner of maintenance building, location of sample EC-SC-03, which contains polychlorinated biphenyls at 1900 parts per million.
16. View east of northeast at transformers at northwest corner of maintenance building. Sample EC-SC-03 collected from northwest (near left) transformer. Note spillage at base of south (right) transformer.
17. View west to oil shack. Note oil stained soil.
18. Corroded and leaking drums located inside west portion of mill building.

ESSEX COPPER SITE INSPECTION  
PHOTOGRAPHIC LOG (Continued)

19. View west to transformers, location of sample EC-SC-02, located at east side of control building.
20. View northwest of sample collection for EC-PS-01.
21. View northeast of pond in which samples EC-PS-01 and EC-PW-01 were collected.
22. View northwest of pond in which samples EC-PS-02 and EC-PW-02 were collected.
23. View east along south portion of site from near the southwest corner, showing sample location EC-PS-02/EC-PW-02.
24. View northeast to shed, with pumphouse attached to south side, at well location for offsite ground water sample EC-GW-01.

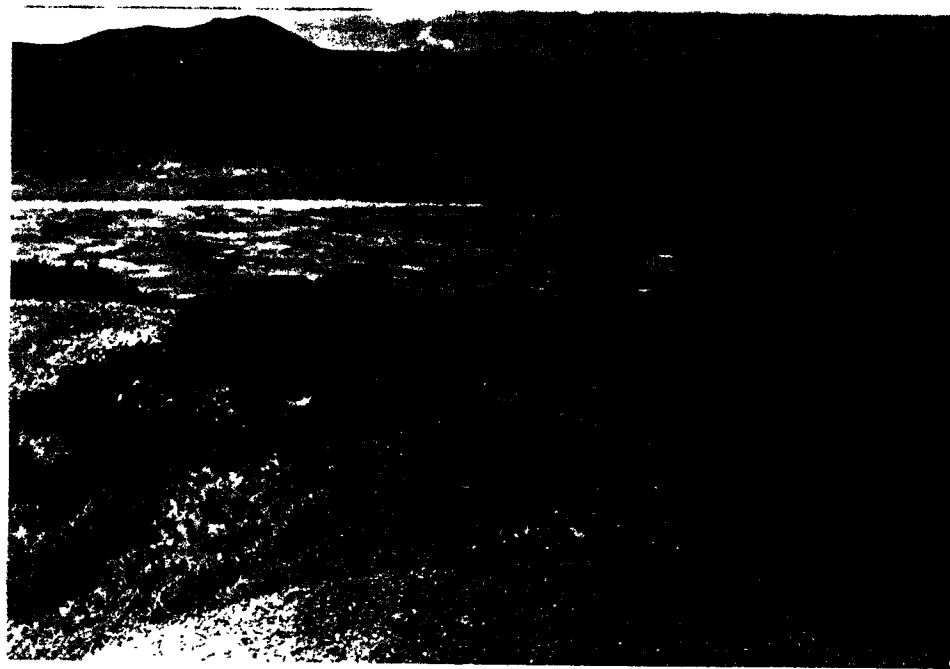
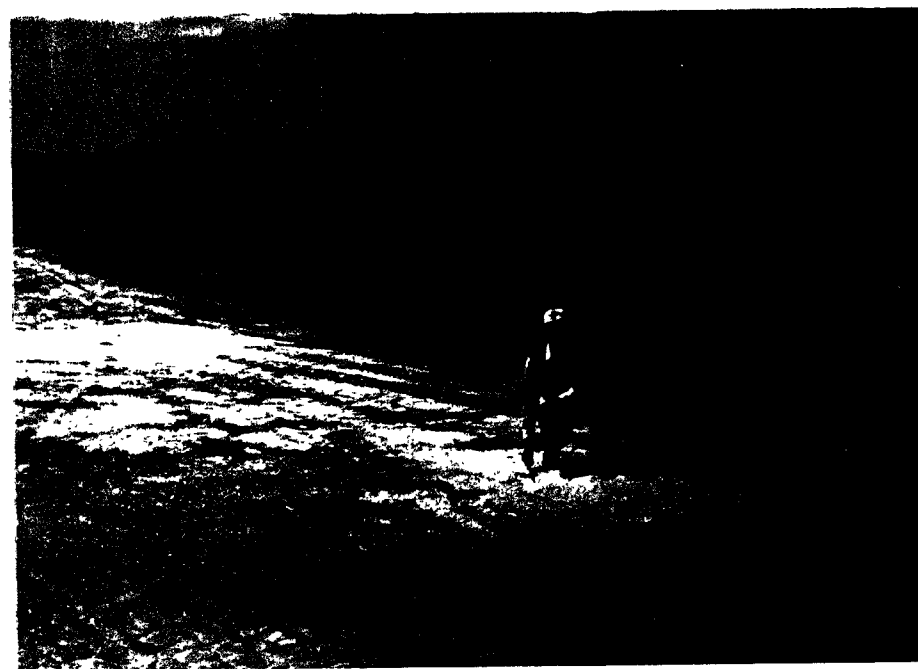
C-LINE #52584  
35MM PRINTS

1 1

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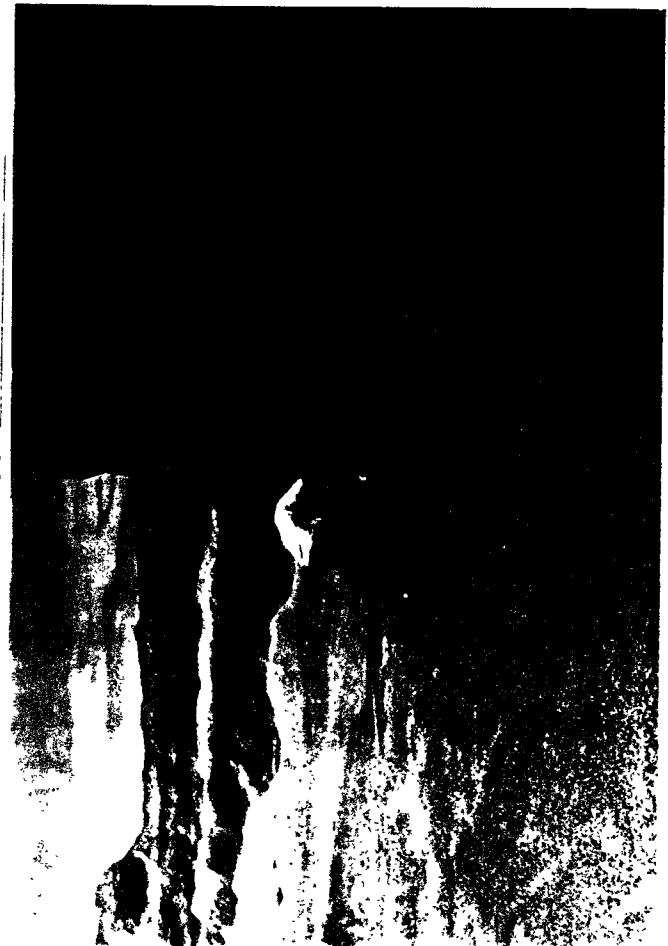
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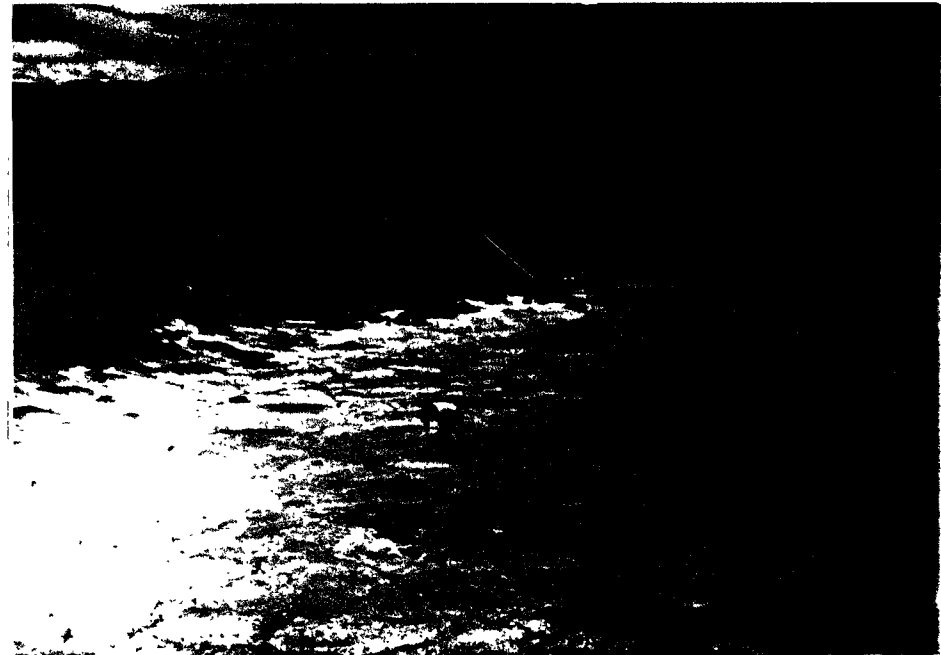
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AGCSA #2584  
C-LINE  
STIRIP MMS2

C-LINE #52584  
35MM PRINTS



9 1



11 1

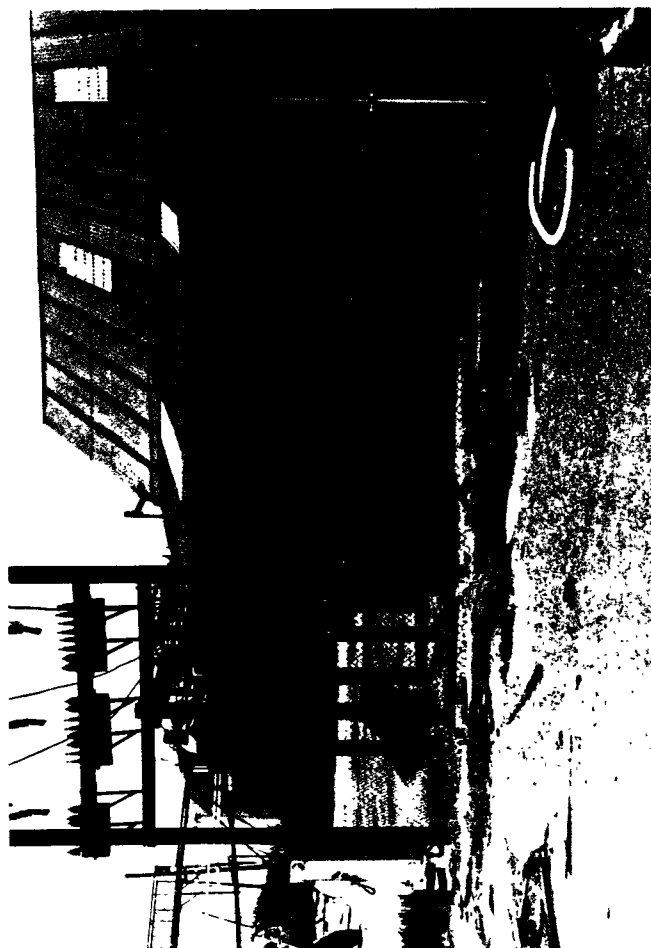
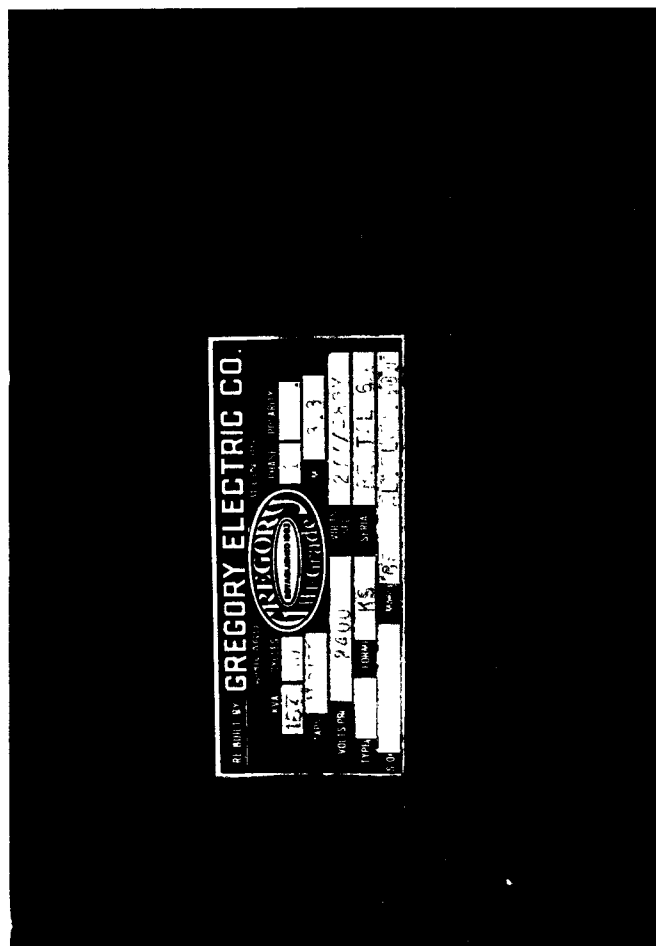


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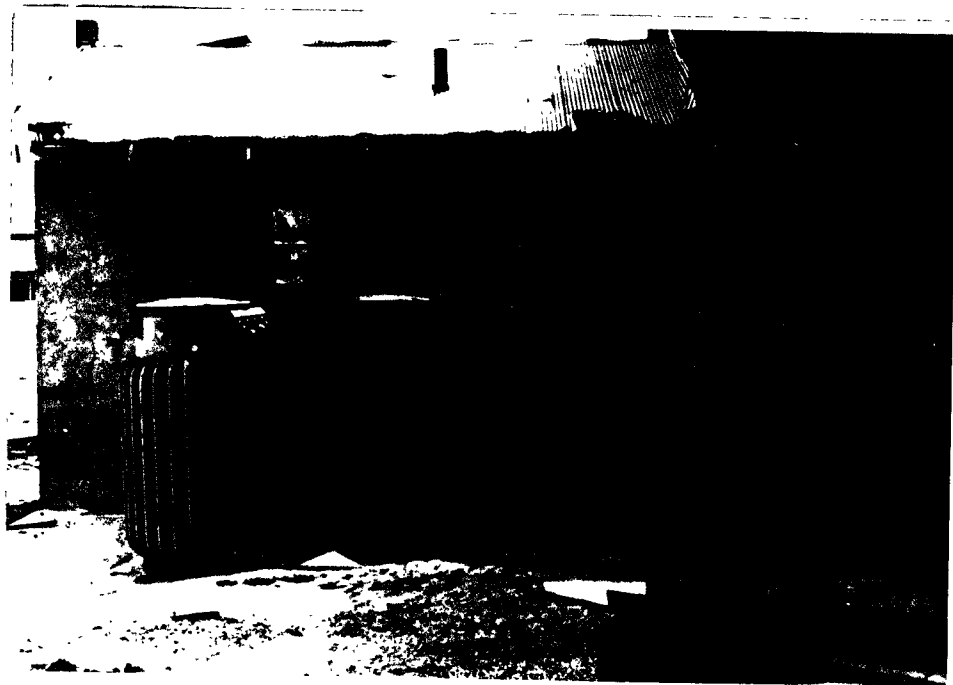


12 1





32MM PRIN2  
C-LINE #2584



17 1



19 1



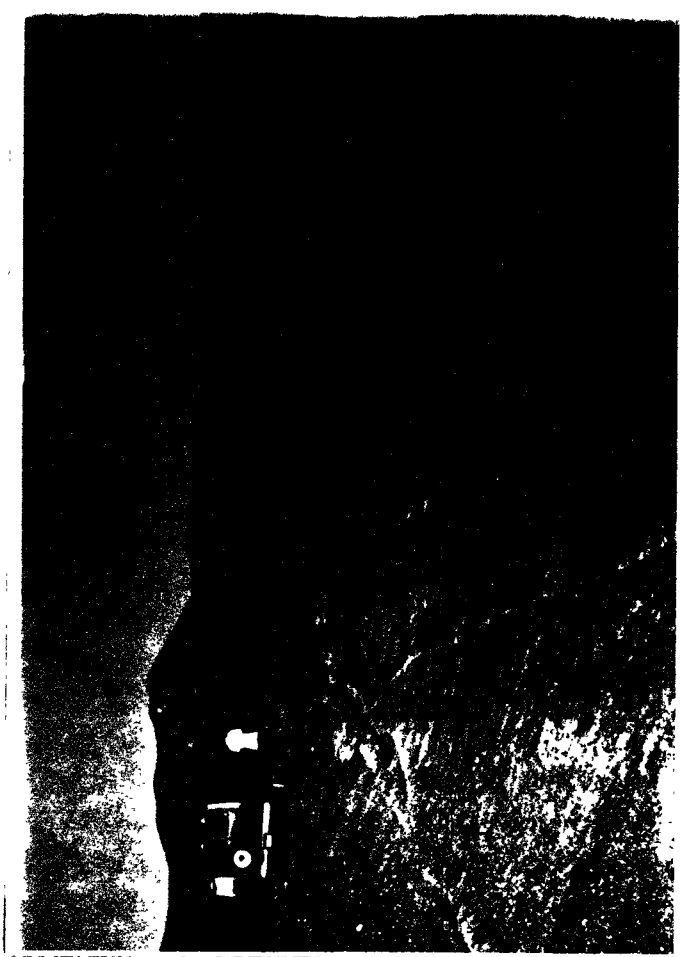
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20 1



21 1



22 1



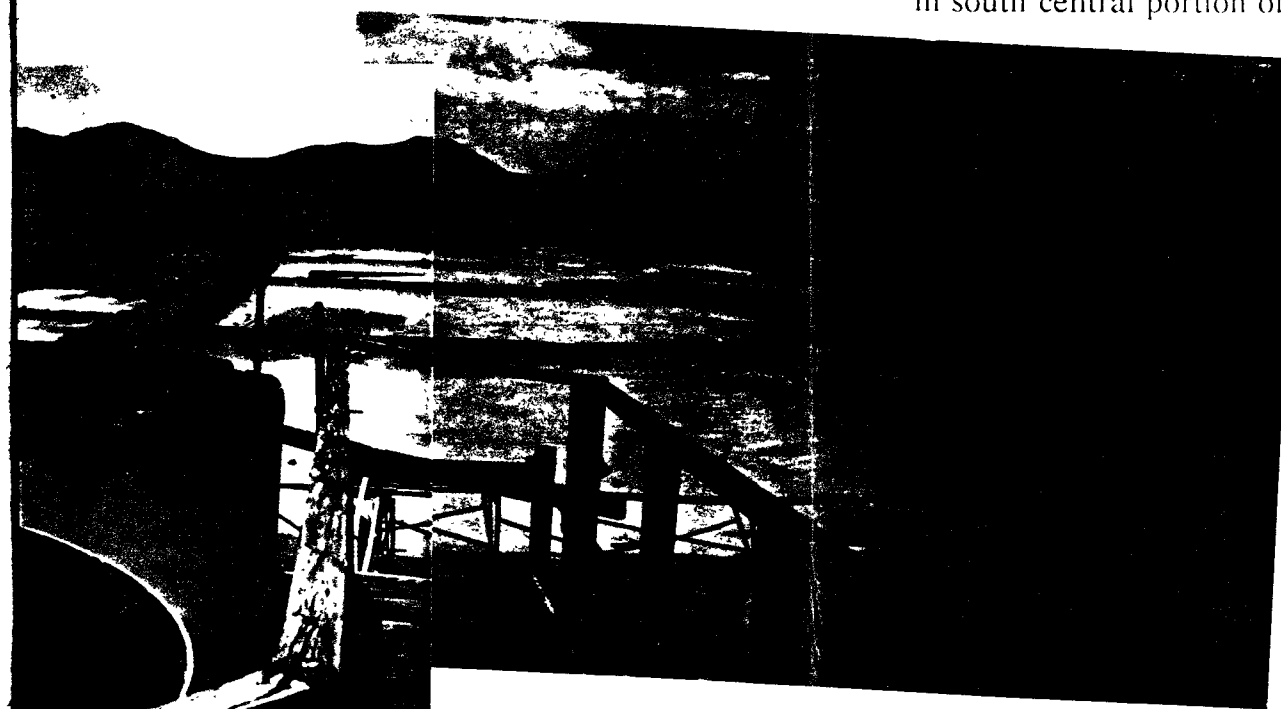
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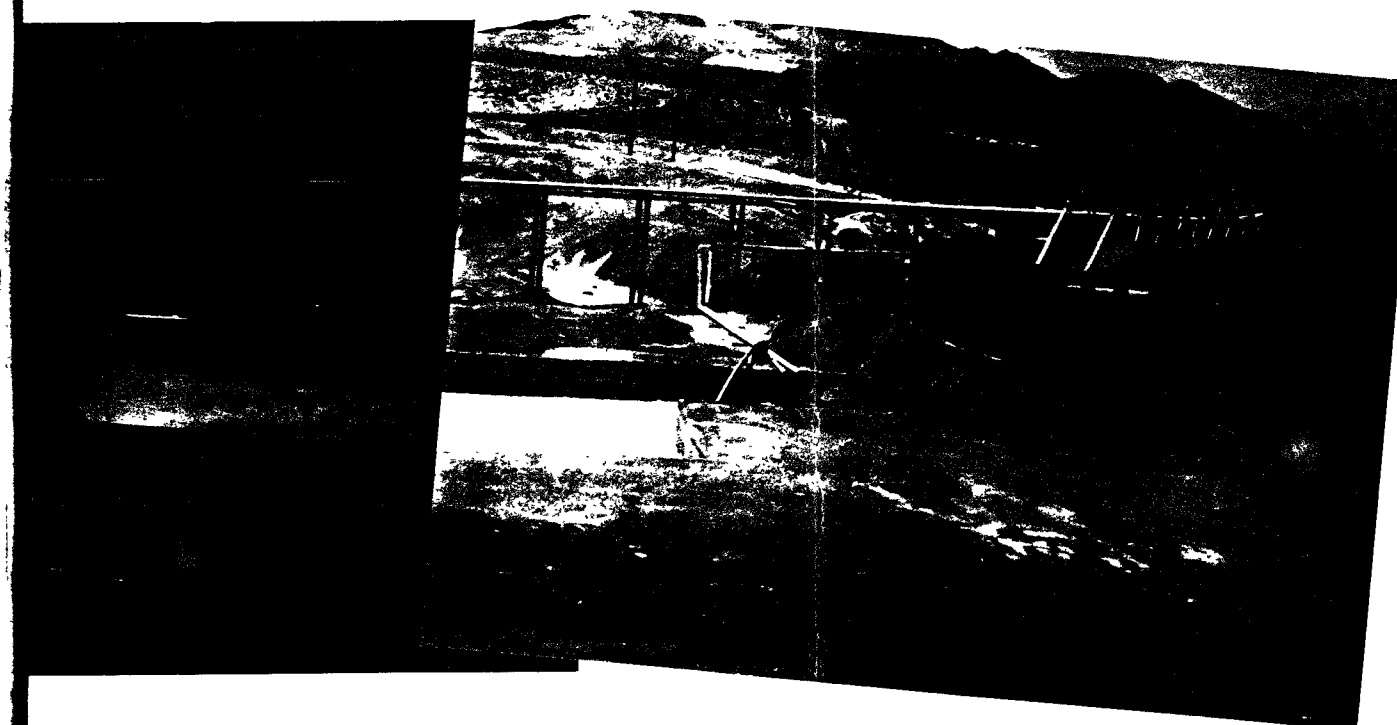
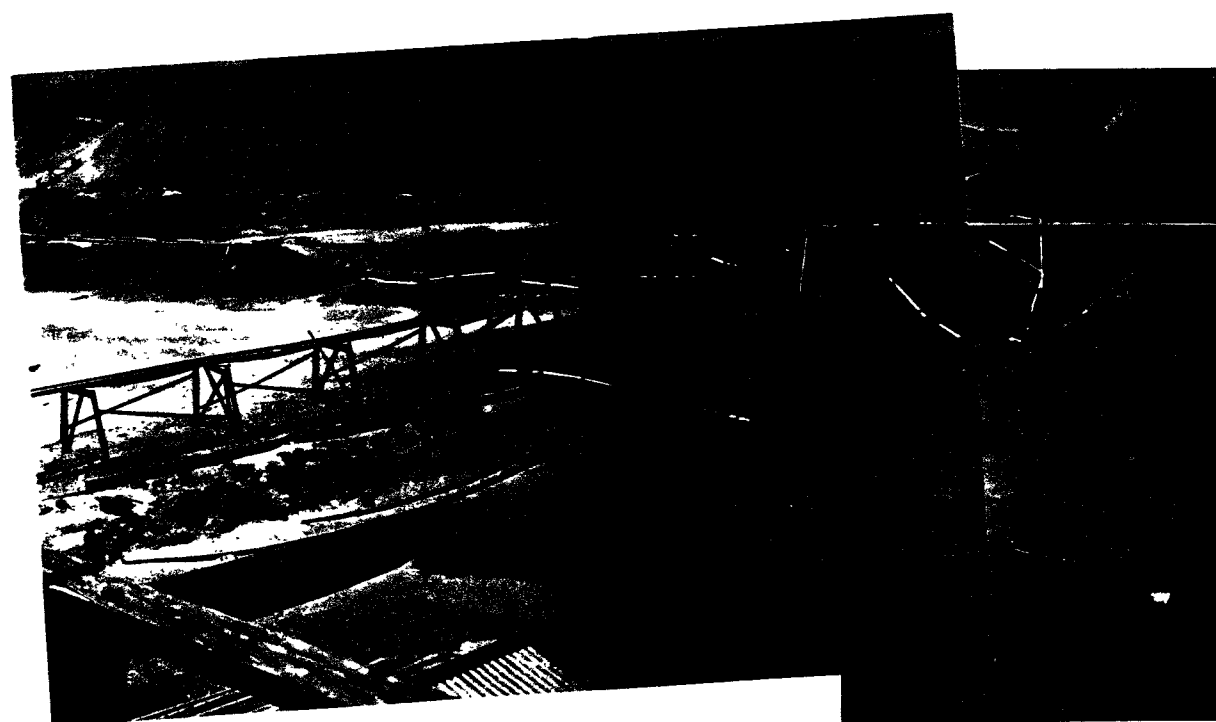
24 1

4855d# ENIL-C  
STINPQ MMS2

ESSEX COPPER SITE INSPECTION  
PHOTOGRAPHIC LOG (Continued)  
North and west panorama from tank catwalk  
in south central portion of site

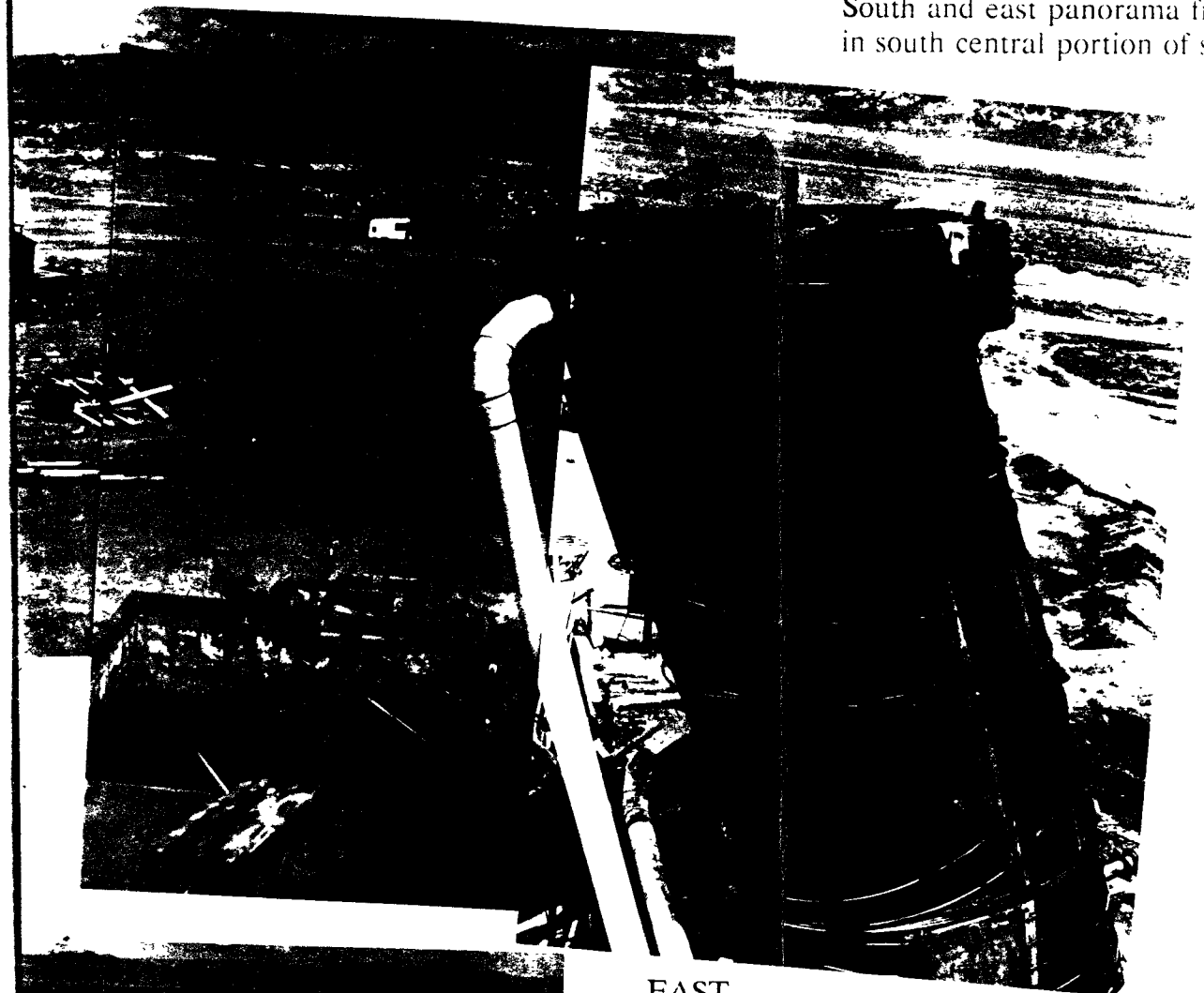


WEST

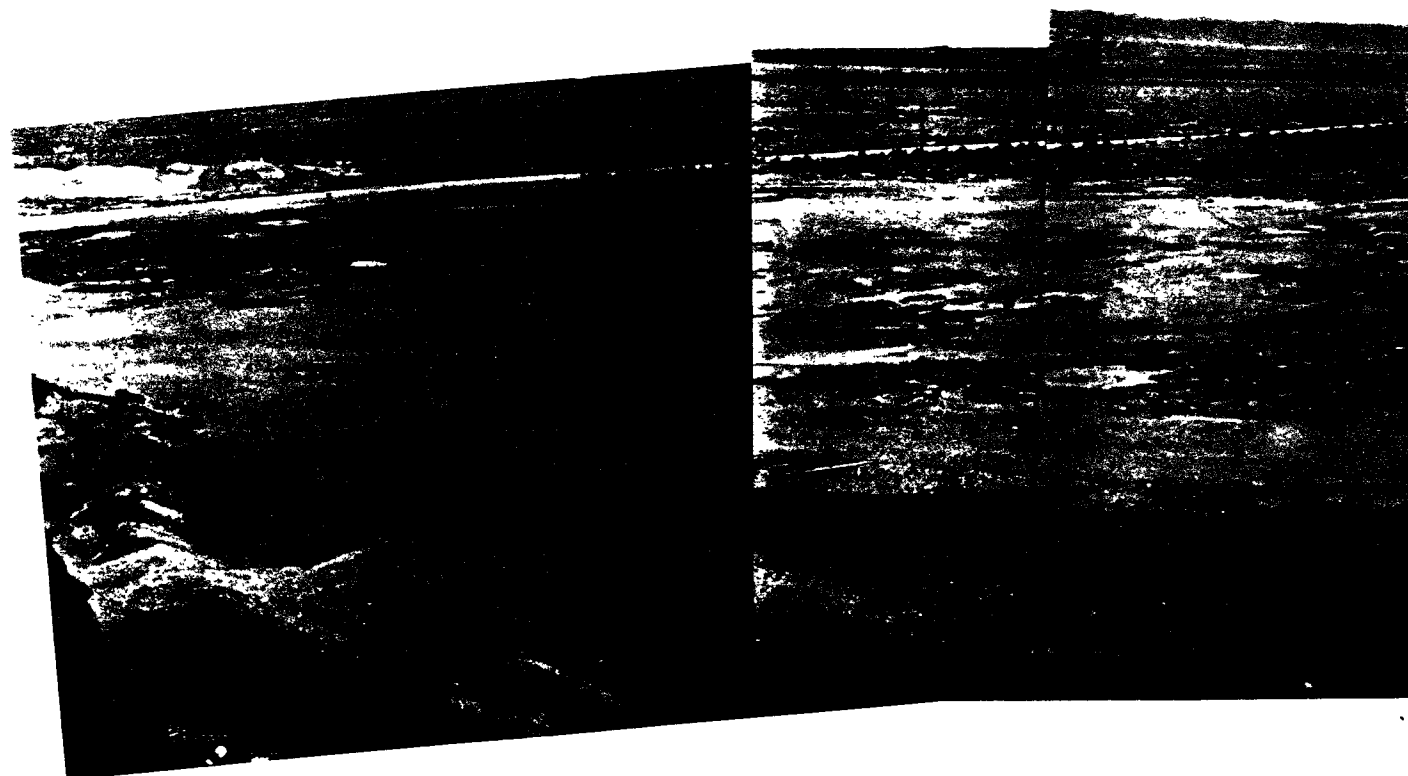


NORTH

ESSEX COPPER SITE INSPECTION  
 PHOTOGRAPHIC LOG (Continued)  
 South and east panorama from tank catwalk  
 in south central portion of site



EAST



SOUTH

Appendix D.  
Signed Consent for  
Access to Property Form

Utah Division of Environmental Response and Remediation  
CERCLA Branch

CONSENT FOR ACCESS TO PROPERTY

Name, Title *Bene Johnson*

Address or Coordinates of Property *Essex Copper Processing Plant (Shields Development)  
~ 3 miles West of Milford, UT, on North side of State Road 21*

I am the record owner, title holder or authorized agent for the record owner, of the property described above (Property), and after receiving reasonable advance notice, I hereby give my consent and grant access for ingress and egress to the Property to officers, employees, and authorized representatives of the Utah Division of Environmental Response and Remediation (UDERR) for the following purposes:

1. The collection of environmental and source characterization samples; and
2. Other such actions related to the collection of the above samples or to the assessment of this site as may be necessary.

I have been informed and understand that these actions by UDERR are undertaken pursuant to the authorities provided in the Comprehensive Environmental Response, Compensation and Liability Act (Superfund) U.S.C.A. 9601. In consideration for this grant of access, I assume no liability for injuries, or damage incurred by UDERR while on the Property.

This consent and grant of access is given voluntarily with knowledge of my right to refuse access. I further acknowledge that no other promises, representations or claims of any kind, either written or oral, have been made by UDERR to induce my consent.

I have been informed of my right to obtain splits of all samples collected on the Property and have waived that right.

(Signature)

*Bene Johnson*

(Date)

*6-2-92*

Appendix E.  
Sample Collection Documentation



CHAIN OF CUSTODY RECORD

REGION VIII, ONE DENVER PLACE  
999 18TH. STREET  
DENVER, CO. 80202-2413

PROJ. NO.		PROJECT NAME				NO. OF CON- TAINERS							REMARKS		
		Essex Copper Processing Plant													
SAMPLERS: (Signature)		Jason Knowlton <i>JLK</i>													
STAT. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION										
EC-SO-01	6/2/92	1130		✓	Background	1	✓	✓					Sample # MHX 964	Tag # 8-26225	
EC-SO-02	6/2/92	1155		✓	W. Pile	1	✓	✓					MHX 965	26226	
EC-SO-03	6/2/92	1210	✓		Base of Hill	1	✓	✓					MHX 966	26227	
EC-SO-04	6/2/92	1215		✓	Excavation	1	✓	✓					MHX 967	26228	
EC-SO-05	6/2/92	1225		✓	N. Central Pile	1	✓	✓					MHX 968	26229	
EC-SO-06	6/2/92	1320		✓	Mill Area	1	✓	✓					MHX 969	26230	
EC-SO-07	6/2/92	1330		✓	NE Pile	1	✓	✓					MHX 970	26231	
EC-SO-08	6/2/92	1340		✓	<del>NE</del> SE Pile	1	✓	✓					MHX 971	26232	
EC-SA-09	6/3/92	1220		✓	N. Off-site	1	✓	✓					MHX 972	26233	
EC-SE-01	6/3/92	1030		✓	Upstream	1	✓	✓					MHX 973	26234	
EC-SE-02	6/3/92	1055		✓	Mill Ditch	1	✓	✓					MHX 974	26235	
EC-SE-03	6/3/92	1120		✓	Downstream	1	✓	✓					MHX 975	26236	
EC-SE-04	6/3/92	1205		✓	Downstream PPE	1	✓	✓					MHX 976	26237	
EC-PS-01	6/3/92	0930		✓	E Pond	1	✓	✓					MHX 977	26238	
EC-PS-02	6/3/92	0945		✓	W. Pond	1	✓	✓					MHX 978	26239	
Relinquished by: (Signature)					Date/Time	Received by: (Signature)					Relinquished by: (Signature)		Date/Time	Received by: (Signature)	
<i>Jason Knowlton</i>					6/9/92										
Relinquished by: (Signature)					Date/Time	Received by: (Signature)					Relinquished by: (Signature)		Date/Time	Received by: (Signature)	
Relinquished by: (Signature)					Date/Time	Received for Laboratory by: (Signature)					Date/Time		Remarks		

Distribution: Original Accompanies Shipment: First Copy to Coordinator Field Files: Second Copy to Representative of Inspected Facility

Split Samples:  
☐ Accepted ☐ Declined \_\_\_\_\_ Signature

REGION VIII, ONE DENVER PLACE  
999 18TH. STREET  
DENVER, CO. 80202-2413

Spill Samples:  
☐ Accepted    ☐ Declined \_\_\_\_\_ Signature



United States Environmental Protection Agency  
Contract Laboratory Program Sample Management Office  
PO Box 818 Alexandria, VA 22313  
703-557-2490 FTS 557-2490

# Inorganic Traffic Report (For CLP Use Only)

Case Number  
**18254**

SAS No. (if applicable)

## 1. Type of Activity (Check one)

- ☐ ENF ☐ NPLD ☐ RA ☒ SI ☐ STSI  
☐ ER ☐ O&M ☐ RD ☐ ST ☐ Other (Specify)  
☐ ESI ☐ PA ☐ RIFS ☐ STPA

## 2. Region Number

**8**

## Sampling Co.

**UDERR**

## 4. Date Shipped

**6/9/92**

## Carrier

**Airborne**

## Sampler (Name)

**Jason Knowlton**

## Airbill Number

**387827661**

## 3. Ship To:

**Skinner + Sherman  
300 Second Ave  
Waltham, MA  
02254**

Double volume required for matrix spike/duplicate aqueous sample.

Ship medium and high concentration samples in paint cans.

See reverse for additional instructions.

## 5. Sample Description (Enter in Column A)

1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (SAS)
7. Waste (SAS)
8. Other (SAS) (Specify)

Non-Superfund Program

## Site Name


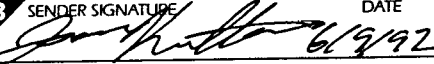
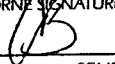
**Essex Copper Processing Plant**

## City, State

**Milford, Utah**

## Site Spill ID

CLP Sample Number (From labels)	(A) Sample Descrip- tion (From box 5)	(B) Concen- tration L=low M=med H=high	(C) List Preserv- ative Used/Vol	(D) RAS Analysis				(E)  Special Handling	(F)  Station Location	(G)  Date/Time of Sample Collection	(H)  Corresponding Organic Sample Number
				Total or Dissolved Metals	Cyanide	Low Conc. Sow					
						Nitrate/ Nitrite	Fluoride				
MHX964	5	L	none	✓	✓				EC-SO-01	6/2 1130	N/A
MHX965	5	L	↓	✓	✓				EC-SO-02	1155	↓
MHX966	5	L	↓	✓	✓				EC-SO-03	1210	↓
MHX967	5	L	↓	✓	✓				EC-SO-04	1215	↓
MHX968	5	L	↓	✓	✓				EC-SO-05	1225	↓
MHX969	5	L	↓	✓	✓				EC-SO-06	1320	↓
MHX970	5	L	↓	✓	✓				EC-SO-07	1330	↓
MHX971	5	L	↓	✓	✓				EC-SO-08	6/2 1340	↓
MHX972	5	L	↓	✓	✓				EC-SO-09	6/3 1220	↓
MHX973	5	L	↓	✓	✓				EC-SE-01	6/3 1030	↓
MHX974	5	L	↓	✓	✓				EC-SE-02	1055	↓
MHX975	5	L	↓	✓	✓				EC-SE-03	1120	↓
MHX976	5	L	↓	✓	✓				EC-SE-04	1205	↓
MHX977	5	L	↓	✓	✓				EC-AS-01	0930	↓
MHX978	5	L	none	✓	✓				EC-PS-02	0945	↓
MHX979	1	L	HNO <sub>3</sub> NaOH	✓	✓				EC-PW-01	0930	↓
MHX980	1	L	↓	✓	✓				EC-PW-02	0945	↓
MHX981	1	L	↓	✓	✓				EC-PW-03	1000	↓
MHX982	2	L	HNO <sub>3</sub> NaOH	✓	✓				EC-PW-01	6/3 1110	↓

<b>1 FROM (COMPANY NAME)</b> <b>UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY</b> <b>288 N 1460 W</b> <b>CITY SALT LAKE CITY STATE UT ZIP CODE (REQUIRED) 84116</b> <b>SENT BY (NAME/DEPT) PHONE</b> <b>Jason L. Knowlton (801) 536-4100</b>		<b>ORIGIN AIRBILL NUMBER</b> <b>SLC 387827661</b> <b>4 CUSTOMER AIRBORNE EXPRESS ACCOUNT NUMBERS</b> <b>SENDER 67413935</b> <b>RECEIVER</b>		<b>AIRBORNE EXPRESS</b> <b>EXECUTIVE OFFICES</b> <b>P.O. BOX 662, SEATTLE, WA 98111</b>  <b>USE THIS AIRBILL FOR SHIPMENTS WITHIN THE U.S. &amp; TO AND FROM PUERTO RICO. ABSENT A HIGHER SHIPMENT VALUATION, CARRIER'S LIABILITY IS LIMITED TO \$9.07 PER POUND PER PIECE. SPECIAL OR CONSEQUENTIAL DAMAGES ARE NOT RECOVERABLE. SEE TERMS AND CONDITIONS ON REVERSE SIDE OF THIS NON-NEGOTIABLE AIRBILL.</b> <b>SCAC AIRB FED ID NO 91-0837469</b>
<b>2 TO</b> <b>Skinner + Sherman</b> <b>ADDRESS 300 Second Avenue</b> <b>CITY Waltham STATE MA ZIP CODE (REQUIRED) 02254</b> <b>Jeff Depaolo (617) 890-7200</b>		<b>5 METHOD OF PAYMENT (ASSUMED SENDER UNLESS OTHERWISE NOTED)</b> <input type="checkbox"/> BILL SENDER <input type="checkbox"/> BILL RECEIVER AIRBORNE ACCOUNT NO <input type="checkbox"/> BILL 3rd PARTY CHECK NO / AMOUNT <input type="checkbox"/> PAID IN ADVANCE <b>BILLING REFERENCE (WILL APPEAR ON INVOICE)</b> <b>ENV RESP/REMEDIATION</b> <b>6 NO OF PACKAGES WEIGHT (LBS)</b> <b>1</b> <b>7 CHECK #</b> <input type="checkbox"/> LETTER EXPRESS		
<b>LOW ORG ACT 4840 768</b> <input type="checkbox"/> DECLARED VALUE OR FULL INSURANCE <b>SHIPMENT VALUATION \$</b> <b>PREPRINT FORMAT NO 2548845</b>		<b>SPECIAL INSTRUCTIONS</b> <input type="checkbox"/> SATURDAY DELIVERY <input type="checkbox"/> HOLD AT AIRBORNE EXPRESS <input type="checkbox"/> LAB PACK <input type="checkbox"/> <b>THANK YOU FOR SHIPPING WITH AIRBORNE EXPRESS!</b>		
<b>3 SENDER SIGNATURE</b>  <b>DATE 6/9/92</b>		<b>AIRBORNE SIGNATURE</b>  <b>DATE 6/9/92</b> <b>TIME</b> <b>ROUTE SLC</b>		


SENDER'S COPY

## CHAIN OF CUSTODY RECORD

State of Utah  
Department of Health  
Division of Laboratory Services  
46 Medical Drive  
Salt Lake City, Utah 84113-1105

proj #                      proj name *Essex Copper*  
sampler *Jasen Knowlton*  
  
bureau/company *DERR*  
address *1950 W N Temple* phone *536-4100*  
cty/st/zip *S.L.C. UT 84116*

[illegible][illegible]

Rel. By (signature)		Rel. By (signature)	D	Rel. By (signature)	D	Rel. By (signature)	D
	P20		T		T		T
Rec. By (signature)	D	Rec. By (signature)	D	Rec. By (signature)	D	Spill Samples (signature):	D
	T		T		T		T
Relinquished by (signature)	D	Custody Officer Lab (signature) 6/10/92	D	Remarks:			
	T	Brian Butler 12:25	T				

**Appendix F.**  
**Analytical Results Summary**

TABLE F-1  
ESSEX COPPER PROCESSING PLANT, BEAVER COUNTY, UTAH  
ANALYTICAL RESULTS - SOIL SAMPLES (mg/kg)

LOCATION:	BACKGROUND	WEST PILE	BASE OF HILL	EXCAVATION	NORTH CENTRAL PILE	MILL AREA	NORTHEAST PILE	SOUTHEAST PILE	NORTH OF SITE
SAMPLE #	EC-SO-01	EC-SO-02	EC-SO-03	EC-SO-04	EC-SO-05	EC-SO-06	EC-SO-07	EC-SO-08	EC-SO-09
TRAFFIC #	MHX964	MHX965	MHX966	MHX967	MHX968	MHX969	MHX970	MHX971	MHX972
Aluminum	7980	8750	6070	4570	6090	668	9870	2640	4300
Antimony	3.2UJ	4.1UJ	3.7UJ	3.3UJ	5.7UJ	3.1UJ	4.3UJ	4.2J	3.8UJ
Arsenic	6.5J	104J	47.1J	8.7J	363J	21.9J	85.2J	202J	71.8J
Barium	108	183	87.3	34.2B	87.6	2.5U	182	44.4	97.6
Beryllium	0.63B	0.35B	0.35B	0.34B	0.51B	0.19B	0.79B	0.29B	0.36B
Cadmium	0.41U	0.51U	0.46U	0.41U	0.72U	0.38U	0.53U	1.4	0.74B
Calcium	13100J	42100J	20300J	4470J	29500J	13900J	21400J	51000J	17900J
Chromium	8.8	9.8	6.5	8.4	111	6.3	9.9	7.5	9.7
Cobalt	6.6B	12.9	9.3B	3.7B	6.4B	14.9	14.7	16.7	8.3B
Copper	189J	2780J	6270J	1150J	2120J	5370J	16500J	10300J	3880J
Iron	12900	47100J	27500	90500	96300	61300	54300	55700	24100
Lead	12.2J	197	45.9J	24.3J	152J	6.3J	62.1J	22.1J	141J
Magnesium	6820	25900	12500	4570	10700	1250	16700	5870	5910
Manganese	400J	854J	492J	98.2J	525J	1040J	748J	2910J	776J
Mercury	0.09U	0.14	0.1U	0.16	0.17U	0.09U	0.15	0.11U	0.11U
Nickel	9.2	5.4J	5.8J	3.3U	3.1U	3.2U	10.3J	5.2J	5.2J
Potassium	2800	3280	1750	5660	2430	57.2U	2460	539B	1540
Selenium	4.2UJ	0.99UJ	0.96UJ	0.83UJ	7.1UJ	R	1.1UJ	4.7U	0.96UJ
Silver	1.4J	32.9	10.5	8.9	25	14.6	15.1	10.6	6.6
Sodium	90.4J	448J	308J	1670	710J	12.9J	183J	32.8J	72.2J
Thallium	0.42U	0.5U	0.48U	0.41U	0.71UJ	0.4U	0.56U	0.44U	0.48U
Vanadium	15.4	16.5	11.9	32.7	32.7	4.7B	23.4	7.7B	14.6
Zinc	45.9	189	117	32.4	117	32	288	449	272
Cyanide	0.53U	0.63U	0.58U	0.56U	0.92U	0.51U	0.67U	0.56U	0.58U

TABLE F-2  
ESSEX COPPER PROCESSING PLANT, BEAVER COUNTY, UTAH  
ANALYTICAL RESULTS - SEDIMENT SAMPLES (mg/kg)

LOCATION: SAMPLE # TRAFFIC #	UPSTREAM EC-SE-01 MHX973	MILL DITCH EC-SE-02 MHX974	DOWNSTREAM EC-SE-03 MHX975	PPE EC-SE-04 MHX976	EAST POND EC-PS-01 MHX977	WEST POND EC-PS-02 MHX978
Aluminum	13700	5310	7020	6960	6860	4920
Antimony	4.1UJ	3.9UJ	3.9UJ	3.9UJ	3.9UJ	4UJ
Arsenic	10.4J	78.9J	148J	36.1J	22J	31.5J
Barium	214	125	57.9	112	85.2	52.6
Beryllium	0.88B	0.41B	0.65B	0.34B	0.47B	0.29B
Cadmium	0.52U	0.49U	3	0.49U	0.49U	0.49U
Calcium	36900J	17400J	74200J	6760J	32100J	11700J
Chromium	13	19.2	18.8	13.9	11	4.8
Cobalt	8.2B	3.1B	19.9	6.9B	7.2B	8.1B
Copper	91.3J	229J	17400J	1310J	3740J	3970J
Iron	15900	48100	56100	34200	27900	30700
Lead	110J	47.5J	90.6J	40.3J	50.1J	31J
Magnesium	9980	4330	13000	5690	6610	8740
Manganese	508J	90.7J	3420J	368J	334J	417J
Mercury	0.11U	0.11U	0.13U	0.11U	0.11U	0.13U
Nickel	13.5	5.1J	8.7J	7.4J	6.4J	4.7U
Potassium	4720	4480	793B	2650	1990	1430
Selenium	5UJ	0.9UJ	2.6J	0.98UJ	4.8UJ	0.99UJ
Silver	1.4J	4.1J	24.4	5.2	5.4	7
Sodium	219J	806J	72.2J	108J	1010J	167J
Thallium	0.5U	0.45U	0.53U	0.49U	0.48U	0.49U
Vanadium	25.6	16.4	17	19.9	13.9	10B
Zinc	124	37.6	1040	103	73.3	71.1
Cyanide	0.67U	0.6U	0.66U	0.65U	0.6U	0.67U



TABLE F-3  
ESSEX COPPER PROCESSING PLANT, BEAVER COUNTY, UTAH  
ANALTTICAL RESULTS - WATER SAMPLES (ug/L)

LOCATION: SAMPLE # TRAFFIC #	EAST POND EC-PW-01 MHX979	WEST POND EC-PW-02 MHX980	TRIP BLANK EC-PW-03 MHX981	OFF SITE WELL EC-GW-01 MHX982
Aluminum	1140000	760000	28.8B	21U
Antimony	R	R	R	R
Arsenic	R	R	R	R
Barium	R	R	R	R
Beryllium	382B	255B	1U	1U
Cadmium	713	537	1U	1UJ
Calcium	507000	535000	28U	45300
Chromium	R	R	R	R
Cobalt	6360	4230	2U	2U
Copper	8210000	10100000	11.1U	6.4UJ
Iron	29000J	76400J	25UJ	447J
Lead	R	R	R	R
Magnesium	3140000	2070000	96.5B	11500
Manganese	430000	190000	1U	26.4U
Mercury	1J	0.77J	0.2UJ	0.2UJ
Nickel	5490	3380	5U	5U
Potassium	314B	743B	194U	3110B
Selenium	R	R	R	R
Silver	300U	300U	3U	3U
Sodium	50200	9900	UJ	39500
Thallium	11.1J	8.5J	1U	5UJ
Vanadium	R	R	R	R
Zinc	75600	53300	8U	207
Cyanide	10UJ	10UJ	10UJ	10UJ

**Appendix G.**  
**Versar Analytical Results and**  
**Quality Assurance Summary**

**DRAFT  
LETTER REPORT  
ESSEX COPPER  
DATA VALIDATION  
INORGANIC ANALYSIS  
EPA CASE #18254**

**OCTOBER 28, 1992**

**Prepared For**

**UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY  
DIVISION OF RESPONSE AND REMEDIATION  
SALT LAKE CITY, UTAH**

**Prepared By**

**VERSAR A & E, INC.  
734 EAST UTAH VALLEY DRIVE  
SUITE 100  
AMERICAN FORK, UTAH 84003**

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Attachment I - Data Assessment Summary

Attachment II - Data Qualification Key and List of Acronyms

Attachment III - Sample Compound Qualifications and Other  
Corrections

## INTRODUCTION

This report summarizes the findings of Versar A & E, Inc., in the validation of Inorganic Analyses performed by EPA contracted laboratories. The validation was completed by a Versar team following the Functional Guidelines used by the U.S. EPA Hazardous Site Evaluation Division.

One hundred percent of the reported test data and no less than 10% of the raw calculations within the sample groups were examined to check for accuracy. This work was performed as directed by the Utah Division of Environmental Response and Remediation (UDERR).

Validation was performed on all samples within EPA Case Number 18254. Included in this case were two Inorganic Sample Delivery Groups, SDG Number MHX 964 and MHX 979.

## SAMPLES ANALYZED

Inorganic Sample Delivery Group (SDG) Number MHX 964 contained 15 soil samples for full Inorganic validation. Inorganic SDG Number MHX 964 contained 4 water samples, also for full Inorganic validation. Samples included in the SDGs were samples MHX 964 through MHX 979.

All samples from both Sample Delivery Groups were tested by Skinner and Sherman Labs of Waltham, Massachusetts. Sample data for this case was delivered to Versar A & E through the Utah Division of Environmental Response and Remediation (UDERR).

## STATEMENT OF WORK, FUNCTIONAL GUIDELINES

The testing laboratory followed the protocol in the U.S. EPA Statement of Work (SOW) dated 3/90 for the Inorganic testing. The validation team used the same SOW during the validation, and no problems were encountered. One item of note is that the U.S. EPA Functional Guidelines for Evaluating Inorganic Analyses used by the validation team was dated 7/88 and was based on the 7/87 SOW for Inorganics. Limits and criteria found in these guidelines were checked against corresponding limits and criteria in the 3/90 SOW to ensure accurate and complete validation of EPA limits and criteria. Any differences between the 7/88 Functional Guidelines and 3/90 SOW were corrected according to the 3/90 SOW criteria.

## EVALUATION CRITERIA

The evaluation of data was based on compliance of data with criteria given in the 3/90 SOW for the categories on the following page.

### Inorganic Analysis Criteria

- |                               |                                |
|-------------------------------|--------------------------------|
| 1. Holding Times              | 7. Matrix Spike Sample Results |
| 2. Calibration                | 8. Furnace Atomic Absorption   |
| 3. Blank Analyses             | 9. ICP Serial Dilution Results |
| 4. ICP Interference Check     | 10. Sample Result Verification |
| Sample Results                | 11. Field Duplicates           |
| 5. Lab Control Sample Results | 12. Overall Assessment of Data |
| 6. Duplicate Sample Results   |                                |

### GENERAL CASE ASSESSMENT

In all cases, the data contained in the two sample delivery groups complied with the EPA Functional Guidelines or was qualified due to minor problems (See Attachment I for a complete listing of Regional Data Assessments and Attachment III for sample compound qualifications). Although most of the data was rated as acceptable, several problems were discovered.

The SDG MHX 964 containing EPA forms I-XIV and the associated raw data was found to be complete with all necessary data to perform the validation. Minor problems resulting in the qualification of data were detected in the evaluation of Blanks, Interference Check Samples, Duplicates, Matrix Spikes, and Furnace Atomic Absorption.

The presence of analytes in blanks resulted in the qualification of Nickel, Barium, and Potassium as undetected (J) in some samples. (See Problems and Actions section of this report for a list of specific samples qualified.) Analysis of Interference Check Samples (ICS) also revealed analytes not originally present in the ICS solution. This required the qualification as estimated (J) or estimated/undetected (UJ) of Sodium in all samples except MHX 967, Silver in MHX 964, 973, and 974, and Nickel in all samples except MHX 964 and MHX 973. Arsenic, Calcium, Copper and Lead in all samples were qualified as estimated (J) or estimated/undetected (UJ) because control limits were exceeded in the Duplicate Sample Analysis. Copper, Antimony, Manganese and Selenium were qualified as estimated (J) or estimated/undetected (UJ) due to Matrix Spike Recoveries being outside limits. The analytes Selenium and Thallium did not meet Furnace Atomic Absorption criteria in some samples and are qualified as J or UJ in a number of samples. One sample, MHX 969, had a low enough Furnace Post Digestion Spike recovery in the analysis for Selenium to require qualification as unusable (R) for that analyte. One transcription error was found in the validation process. It is shown corrected at the end of Attachment III.

The data package corresponding to SDG Number MHX 979 appeared complete and in order. While holding times from the sampling date to the beginning of analysis were not exceeded, it appears that the samples to be tested for cyanide were not preserved to the proper pH of 12 or greater. As a result, the cyanide results for all samples are qualified as estimated (J) or estimated/undetected (UJ), depending on the reported sample concentration. The analytes Cadmium, Copper, Manganese and Sodium were qualified as undetected (U) in one or two of the four samples because of their presence in blanks. Cadmium in MHX 982 and Sodium in MHX 981 were qualified as estimated (J) because of problems with the Interference Check Samples (ICS). The Duplicate Sample Analysis showed that Arsenic, Chromium, Iron, and Mercury did not meet the required criteria and were qualified as estimated (J) or estimated/undetected (UJ). Additionally, Arsenic and Chromium did not meet the minimum criteria for the Matrix Spike Sample Analysis, nor did the analytes Antimony, Barium, Lead, Selenium, and Vanadium. The spike recovery was poor enough (less than 10% recovery) to qualify the results of these seven analytes as unusable (R) in all samples. Arsenic, Selenium, Lead and Thallium did not meet the Furnace Atomic Absorption criteria in some of the samples. Thallium was qualified as estimated (J) or estimated/undetected in three samples while the Arsenic, Selenium, and Lead results were already qualified as unusable (R), as noted previously. While the results of many analytes in the four samples of this SDG were qualified, most qualifications applied to analytes found below Contract Required Detection Limits (CRDL).

#### PROBLEMS AND ACTIONS

**SDG/MATRIX:**  
MHX 964/Soil

**ANALYSIS:**  
INORGANIC

**SAMPLES VALIDATED:**  
MHX 964-978

Holding Times: Holding times were found to be within limits prescribed for water samples except for those samples used for cyanide analysis which exceeded by one day the limits set for water samples. However, as no standard has been established for soil samples such as those in this SDG, no qualifications were made.

Blank Analyses: Nickel was qualified as undetected (U) in samples MHX 967, 968, 969, and 978, and Barium and Potassium were qualified as undetected (U) in MHX 969 because of their presence in similar quantities in the blank.

ICP Interference Check Sample (ICS): The following list of analytes were qualified in the samples indicated because of concentrations similar to those found in the ICS:

<u>Analyte</u>	<u>Samples Qualified</u>	<u>Qualification</u>
Na	All Samples except MHX 967	J, UJ
Ag	MHX 964, 973, 974	J
Ni	All Samples except MHX 964, 973	J

Duplicate Samples: The results for Arsenic, Calcium, Copper and Lead were qualified as estimated (J) or estimated/undetected (UJ) in all samples because the relative percent difference was outside the required limits for duplicate samples.

Matrix Spike Samples: The results of Antimony, Copper, Manganese and Selenium were qualified as estimated (J) or estimated/undetected (UJ) in all samples due to spike recoveries below the specified limits.

Furnace Atomic Absorption: Post Digestion Spike Recoveries below required levels caused the following samples to be qualified:

<u>Analyte</u>	<u>Samples Qualified</u>	<u>Qualification</u>
Se	MHX 969	R
Se	MHX 964, 965, 970, 972, 976, 977, 978	J, UJ
Tl	MHX 968	J, UJ

**SDG/MATRIX:**  
MHX 979/Water

**ANALYSIS:**  
INORGANIC

**SAMPLES VALIDATED:**  
MHX 979-982

Holding Times: All Cyanide results were qualified estimated (J) or estimated/undetected (UJ) because the Cyanide samples were not preserved to the proper pH of 12 or greater.

Blank Analyses: Cadmium in MHX 982, Copper in MHX 981 and 982, Manganese in MHX 982, and Sodium in MHX 981 were qualified as undetected (U) because they were found in similar quantities in blanks.

ICP Interference Check Sample (ICS): Cadmium and Copper in MHX 982 and Sodium in MHX 981 were additionally qualified as estimated (J) because of similar concentrations found in the ICS.

Duplicate Samples: The results for Arsenic, Chromium, Iron, and Mercury were qualified as estimated (J) or estimated/undetected (UJ) in all four samples because the relative percent difference was outside the specified  $\pm 20\%$  limit for duplicate samples.

Matrix Spike Samples: Very poor spike recoveries (below 10% recoveries) necessitated that results for Antimony, Arsenic,



Barium, Chromium, Lead, Selenium, and Vanadium be qualified as unusable (R) in all samples.

Furnace Atomic Absorption: Post Digestion Spike Recoveries below required levels caused the following samples to be qualified:

<u>Analyte</u>	<u>Samples Qualified</u>	<u>Qualification</u>
As	MHX 979, 980	U, UJ
Se	MHX 979, 980, 982	U, UJ
Pb	All Samples	U, UJ
Tl	MHX 979, 980, 982	U, UJ

**ATTACHMENT I**  
**DATA ASSESSMENT SUMMARIES**

# INORGANIC REGIONAL DATA ASSESSMENT

CASE NO. 18254  
 LABORATORY: SKINNER & SHERMAN LABS  
 (SKINER)  
 SDG # MHX 964  
 SOW # 3/90  
 DPO: ACTION \_\_\_\_\_ FYI \_\_\_\_\_

SITE ESSEX COPPER  
 NO. OF SAMPLES/\_\_\_\_\_  
 MATRIX 15 / SOIL  
 REVIEWER (IF NOT ESD) VERSAR  
 REVIEWER'S NAME T. YORGASON  
 COMPLETION DATE OCTOBER 26, 1992

## DATA ASSESSMENT SUMMARY

	ICP	AA	Hg	CYANIDE
1. HOLDING TIMES	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
2. CALIBRATIONS	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
3. BLANKS	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
4. ICS	<u>O</u>			
5. LCS	<u>O</u>	<u>O</u>		
6. DUPLICATE ANALYSIS	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
7. MATRIX SPIKE	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
8. MSA		<u>O</u>		
9. SERIAL DILUTION	<u>O</u>			
10. SAMPLE VERIFICATION	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
11. OTHER QC	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
12. OVERALL ASSESSMENT	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>

O = Data had no problems/or qualified due to minor problems.

M = Data qualified due to major problems.

Z = Data unacceptable.

X = Problems, but do not affect data.

ACTION ITEMS: Qualifications were made because minor problems were found with Blanks, ICS,  
Duplicate Analysis, Matrix Spike Analysis, and Furnace AA. Except as noted below, most  
qualifications were applied to results less than CRDL.

AREAS OF CONCERN: Problems with Duplicate Sample Analysis required qualification of results  
above CRDL for As, Ca, Cu and Pb.

NOTABLE PERFORMANCE: \_\_\_\_\_

# INORGANIC REGIONAL DATA ASSESSMENT

CASE NO. 18254  
 LABORATORY: SKINNER & SHERMAN LABS  
 (SKINER)  
 SDG # MXH 979  
 SOW # 3/90  
 DPO: ACTION \_\_\_\_\_ FYI \_\_\_\_\_

SITE ESSEX COPPER  
 NO. OF SAMPLES/\_\_\_\_\_  
 MATRIX 4 / WATER  
 REVIEWER (IF NOT ESD) VERSAR  
 REVIEWER'S NAME T. YORGASON  
 COMPLETION DATE OCTOBER 27, 1992

## DATA ASSESSMENT SUMMARY

	ICP	AA	Hg	CYANIDE
1. HOLDING TIMES	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
2. CALIBRATIONS	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
3. BLANKS	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
4. ICS	<u>O</u>			
5. LCS	<u>O</u>	<u>O</u>		
6. DUPLICATE ANALYSIS	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
7. MATRIX SPIKE	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
8. MSA		<u>O</u>		
9. SERIAL DILUTION	<u>O</u>			
10. SAMPLE VERIFICATION	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
11. OTHER QC	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>
12. OVERALL ASSESSMENT	<u>O</u>	<u>O</u>	<u>O</u>	<u>O</u>

O = Data had no problems/or qualified due to minor problems.  
 M = Data qualified due to major problems.  
 Z = Data unacceptable.  
 X = Problems, but do not affect data.

ACTION ITEMS: Only minor qualification of results greater than CRDL. Many minor qualifications to results less than CRDL.

AREAS OF CONCERN: \_\_\_\_\_

NOTABLE PERFORMANCE: \_\_\_\_\_

**ATTACHMENT II**  
**DATA QUALIFICATION KEY**  
**& LIST OF ACRONYMS**

### DATA QUALIFICATION KEY

- A - Acceptable data.
- J - The associated numerical value is an estimated quantity.
- R - Reject data due to quality control criteria. The data is unusable (compound may or may not be present). Resampling and reanalysis is necessary for verification.
- U - The compound was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
- UJ - The compound was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity.

### INORGANIC ANALYSIS QUALIFIERS

C (concentration) qualifier - either B or U. B indicates that sample result is less than CRQL, but is greater than IDL. U indicates that sample result was below the IDL.

Q qualifier - Given in a column on Form I. Entered by the laboratory and indicates specific problems with quality control. Specific entries and meanings can be found on page B-20 of the 3/90 Inorganics Statement of Work.

M (method) qualifier - Given in a column on the right side of Form I. Indicates the analysis method used and reported on Form I. Specific entries and meanings can be found on page B-20 of the 3/90 Inorganics Statement of Work.

## LIST OF ACRONYMS

AA	Atomic Absorption
BNA	Base/Neutral/Acid Compounds - compounds analyzed by semivolatile technique
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
GC/MS	Gas Chromatograph/Mass Spectrometer
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
IDL	Instrument Detection Limit
Initial Calibration	The establishment of a calibration curve with the appropriate number of standards and concentration range. The calibration curve plots absorbance or emission versus concentration of standards.
IS	Internal Standards - Compounds added to every VOA and BNA standard, blank, matrix spike duplicate, and sample extract at a known concentration, prior to instrumental analysis. Internal standards are used as the basis for quantitation of the target compounds.
MS	Matrix Spike - introduction of a known concentration of analyte into a sample to provide information about the effect of the sample matrix on the digestion and measurement methodology.
MS/MSD	Matrix Spike/Matrix Spike Duplicate
m/z	The ratio of mass (m) to charge (z) of ions measured by GC/MS.
%D	Percent Difference
Pest	Pesticides
Post digestion Spike	The addition of a known amount of standard after digestion. (Also identified as analytical spike, or spike, for furnace analyses.)

QC	Quality Control - Routine application of procedures for controlling the monitoring process.
RPD	Relative Percent Difference (between matrix spike and matrix spike duplicate).
RRF	Relative Response Factor
$\overline{\text{RRF}}$	Average Relative Response Factor
RRT	Relative Retention Time (with relation to internal standard).
RSD	Relative Standard Deviation
RT	Retention Time
Serial Dilution	A sample run at a specific dilution to determine whether any significant chemical or physical interferences exist due to sample matrix effects (ICP only).
SDG	<p>Sample Delivery Group - Defined by one of the following, whichever occurs first:</p> <ul style="list-style-type: none"> <li>◦ Case of field samples</li> <li>◦ Each 20 field samples within a Case</li> <li>◦ Each 14-day calendar period during which field samples in a Case are received, beginning with receipt of the first sample in the SDG. (For VOA contracts, the calendar period is 7-day.)</li> </ul>
SOW	Statement of Work
SV	Semivolatile analysis - Method based on analysis by GC/MS for BNA organic compounds.
TCL	Target Compound List
TIC	Tentatively Identified Compound - A compound not on the TCL.
VOA	Volatile Organic Analysis - Method based on the purge and trap technique for organic compound analysis.



**ATTACHMENT III**  
**SAMPLE COMPOUND QUALIFICATIONS**  
**AND OTHER CORRECTIONS**

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX964

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

Matrix (soil/water): SOIL

Lab Sample ID: 06107-015

Level (low/med): LOW

Date Received: 06/10/92

Solids: 94.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	7980.00			P	
7440-36-0	Antimony	3.20	U	N	P	UJ
7440-38-2	Arsenic	6.50		*	F	J
7440-39-3	Barium	108.00			P	
7440-41-7	Beryllium	0.63	B		P	
7440-43-9	Cadmium	0.41	U		P	
7440-70-2	Calcium	13100.00		*	P	J
7440-47-3	Chromium	8.80			P	
7440-48-4	Cobalt	6.60	B		P	
7440-50-8	Copper	189.00		*N	P	J
7439-89-6	Iron	12900.00			P	
7439-92-1	Lead	12.20		*	F	J
7439-95-4	Magnesium	6820.00			P	
7439-96-5	Manganese	400.00		N	P	J
7439-97-6	Mercury	0.09	U		CV	
7440-02-0	Nickel	9.20			P	
7440-09-7	Potassium	2800.00			P	
7782-49-2	Selenium	4.20	U	WN	F	UJ
7440-22-4	Silver	1.40	B		P	J
7440-23-5	Sodium	90.40	B		P	J
7440-28-0	Thallium	0.42	U		F	
7440-62-2	Vanadium	15.40			P	
7440-66-6	Zinc	45.90			P	
	Cyanide	0.53	U		CA	

Color Before: BROWN

Clarity Before:

Texture: FINE

Color After: BROWN

Clarity After:

Artifacts: YES

Comments:  
ROCKS

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX965

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

ix (soil/water): SOIL

Lab Sample ID: 06107-02S

l (low/med): LOW

Date Received: 06/10/92

lids: 74.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	8750.00			P	
7440-36-0	Antimony	4.10	U	N	P	W
7440-38-2	Arsenic	104.00		*	F	J
7440-39-3	Barium	183.00			P	
7440-41-7	Beryllium	0.35	B		P	
7440-43-9	Cadmium	0.51	U		P	
7440-70-2	Calcium	42100.00		*	P	J
7440-47-3	Chromium	9.80			P	
7440-48-4	Cobalt	12.90			P	
7440-50-8	Copper	2780.00		N*	P	J
7439-89-6	Iron	47100.00			P	J
7439-92-1	Lead	197.00		*	F	
7439-95-4	Magnesium	25900.00			P	
7439-96-5	Manganese	854.00		N	P	J
7439-97-6	Mercury	0.14			CV	
7440-02-0	Nickel	5.40	B		P	J
7440-09-7	Potassium	3280.00			P	
7782-49-2	Selenium	0.99	U	WN	F	W
7440-22-4	Silver	32.90			P	
7440-23-5	Sodium	448.00	B		P	J
7440-28-0	Thallium	0.50	U		F	
7440-62-2	Vanadium	16.50			P	
7440-66-6	Zinc	189.00			P	
	Cyanide	0.63	U		CA	

or Before: BROWN

Clarity Before:

Texture: FINE

or After: BROWN

Clarity After:

Artifacts:

nents:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX966

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-00-0100

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

ix (soil/water): SOIL

Lab Sample ID: 06107-03S

.1 (low/med): LOW

Date Received: 06/10/92

.lids: 79.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	6070.00			P	
7440-36-0	Antimony	3.70	U	N	P	U
7440-38-2	Arsenic	47.10			F	J
7440-39-3	Barium	87.30			P	
7440-41-7	Beryllium	0.35	B		P	
7440-43-9	Cadmium	0.46	U		P	
7440-70-2	Calcium	20300.00		*	P	J
7440-47-3	Chromium	6.50			P	
7440-48-4	Cobalt	9.30	B		P	
7440-50-8	Copper	6270.00		N*	P	J
7439-89-6	Iron	27500.00			P	
7439-92-1	Lead	45.90			F	J
7439-95-4	Magnesium	12500.00			P	
7439-96-5	Manganese	492.00		N	P	J
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	5.80	B		P	J
7440-09-7	Potassium	1750.00			P	
7782-49-2	Selenium	0.96	U		F	U
7440-22-4	Silver	10.50			P	
7440-23-5	Sodium	308.00	B		P	J
7440-28-0	Thallium	0.48	U		F	
7440-62-2	Vanadium	11.90			P	
7440-66-6	Zinc	117.00			P	
	Cyanide	0.58	U		CA	

or Before: BROWN

Clarity Before:

Texture: FINE

or After: BROWN

Clarity After:

Artifacts:

ments:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX967

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

rix (soil/water): SOIL

Lab Sample ID: 06107-04S

el (low/med): LOW

Date Received: 06/10/92

olids: 89.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	4570.00			P	
7440-36-0	Antimony	3.30	U	N	P	U
7440-38-2	Arsenic	8.70		*	F	J
7440-39-3	Barium	34.20	B		P	
7440-41-7	Beryllium	0.34	B		P	
7440-43-9	Cadmium	0.41	U		P	
7440-70-2	Calcium	4470.00		*	P	J
7440-47-3	Chromium	8.40			P	
7440-48-4	Cobalt	3.70	B		P	
7440-50-8	Copper	1150.00		N*	P	J
7439-89-6	Iron	90500.00			P	
7439-92-1	Lead	24.30		S*	F	J
7439-95-4	Magnesium	4570.00			P	
7439-96-5	Manganese	98.20		N	P	J
7439-97-6	Mercury	0.16			CV	
7440-02-0	Nickel	3.30	B		P	U
7440-09-7	Potassium	5660.00			F	
7782-49-2	Selenium	0.83	U	N	F	U
7440-22-4	Silver	8.90			P	
7440-23-5	Sodium	1670.00			P	
7440-28-0	Thallium	0.41	U		F	
7440-62-2	Vanadium	32.70			P	
7440-66-6	Zinc	32.40			P	
	Cyanide	0.56	U		CA	

or Before: BROWN

Clarity Before:

Texture: COARSE

or After: BROWN

Clarity After:

Artifacts: YES

ments:  
ROCKS

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX968

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

Matrix (soil/water): SOIL

Lab Sample ID: 06107-05S

pH (low/med): LOW

Date Received: 06/10/92

Solids: 52.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	6090.00			P	
7440-36-0	Antimony	5.70	U	N	P	UJ
7440-38-2	Arsenic	363.00		*	F	J
7440-39-3	Barium	87.60			P	
7440-41-7	Beryllium	0.51	B		P	
7440-43-9	Cadmium	0.72	U		P	
7440-70-2	Calcium	29500.00		*	P	J
7440-47-3	Chromium	111.00			P	
7440-48-4	Cobalt	6.40	B		P	
7440-50-8	Copper	2120.00		N*	P	J
7439-89-6	Iron	96300.00			P	
7439-92-1	Lead	152.00		*	F	J
7439-95-4	Magnesium	10700.00			P	
7439-96-5	Manganese	525.00		N	P	J
7439-97-6	Mercury	0.17	U		CV	
7440-02-0	Nickel	3.10	B		P	U
7440-09-7	Potassium	2430.00			P	
7782-49-2	Selenium	7.10	U	WN	F	UJ
7440-22-4	Silver	25.00			P	
7440-23-5	Sodium	710.00	B		P	J
7440-28-0	Thallium	0.71	U	W	F	UJ
7440-62-2	Vanadium	32.70			P	
7440-66-6	Zinc	117.00			P	
	Cyanide	0.92	U		CA	

Color Before: BROWN

Clarity Before:

Texture: COARSE

Color After: BROWN

Clarity After:

Artifacts: YES

Comments:  
ROCKS

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX969

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

ix (soil/water): SOIL

Lab Sample ID: 06107-063

l (low/med): LOW

Date Received: 06/10/92

lids: 95.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	668.00			P	
7440-36-0	Antimony	3.10	U	N	P	U
7440-38-2	Arsenic	21.90		*	F	J
7440-39-3	Barium	2.50	B		P	U
7440-41-7	Beryllium	0.19	U		P	
7440-43-9	Cadmium	0.38	U		P	
7440-70-2	Calcium	13900.00		*	P	J
7440-47-3	Chromium	6.30			P	
7440-48-4	Cobalt	14.90			P	
7440-50-8	Copper	5370.00		N*	P	J
7439-89-6	Iron	61300.00			P	
7439-92-1	Lead	6.30		*	F	J
7439-95-4	Magnesium	1250.00			P	
7439-96-5	Manganese	1040.00		N	P	J
7439-97-6	Mercury	0.09	U		CV	
7440-02-0	Nickel	3.20	B		P	U
7440-09-7	Potassium	57.20	B		P	U
7782-49-2	Selenium	4.00	U	EN	F	R
7440-22-4	Silver	14.60			P	
7440-23-5	Sodium	12.90	U		P	UJ
7440-28-0	Thallium	0.40	U		F	
7440-62-2	Vanadium	4.70	B		P	
7440-66-6	Zinc	32.00			P	
	Cyanide	0.51	U		CA	

Color Before: BLACK

Clarity Before:

Texture: FINE

Color After: BLACK

Clarity After:

Artifacts:

Comments:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX970

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

rix (soil/water): SOIL

Lab Sample ID: 06107-07S

el (low/med): LOW

Date Received: 06/10/92

olids: 70.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	9810.00			P	
7440-36-0	Antimony	4.30	U	N	P	U
7440-38-2	Arsenic	85.20		*	F	J
7440-39-3	Barium	182.00			P	
7440-41-7	Beryllium	0.79	B		P	
7440-43-9	Cadmium	0.53	U		P	
7440-70-2	Calcium	21400.00		*	P	J
7440-47-3	Chromium	9.90			P	
7440-48-4	Cobalt	14.70			P	
7440-50-8	Copper	16500.00		N*	P	J
7439-89-6	Iron	54300.00			P	
7439-92-1	Lead	62.10		*	F	J
7439-95-4	Magnesium	16700.00			P	
7439-96-5	Manganese	748.00		N	P	J
7439-97-6	Mercury	0.15			CV	
7440-02-0	Nickel	10.30	B		P	J
7440-09-7	Potassium	2460.00			P	
7782-49-2	Selenium	1.10	U	WN	F	U
7440-22-4	Silver	15.10			P	
7440-23-5	Sodium	183.00	B		P	J
7440-28-0	Thallium	0.56	U		F	
7440-62-2	Vanadium	23.40			P	
7440-66-6	Zinc	288.00			P	
	Cyanide	0.67	U		CA	

Color Before: BROWN

Clarity Before:

Texture: COARSE

Color After: BROWN

Clarity After:

Artifacts:

Comments:



## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX971

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

ix (soil/water): SOIL

Lab Sample ID: 06107-08S

el (low/med): LOW

Date Received: 06/10/92

olids: 83.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	2640.00			P	
7440-36-0	Antimony	4.20	B	N	P	J
7440-38-2	Arsenic	202.00		S*	F	J
7440-39-3	Barium	44.40			P	
7440-41-7	Beryllium	0.29	B		P	
7440-43-9	Cadmium	1.40			P	
7440-70-2	Calcium	51000.00		*	P	J
7440-47-3	Chromium	7.50			P	
7440-48-4	Cobalt	16.70			P	
7440-50-8	Copper	10300.00		N*	P	J
7439-89-6	Iron	55700.00			P	
7439-92-1	Lead	22.10		S*	F	J
7439-95-4	Magnesium	5870.00			P	
7439-96-5	Manganese	2910.00		N	P	J
7439-97-6	Mercury	0.11	U		CV	
7440-02-0	Nickel	5.20	B		P	J
7440-09-7	Potassium	539.00	B		P	
7782-49-2	Selenium	4.70	B	N	F	J
7440-22-4	Silver	10.60			P	
7440-23-5	Sodium	32.80	B		P	J
7440-28-0	Thallium	0.44	U		F	
7440-62-2	Vanadium	7.70	B		P	
7440-66-6	Zinc	449.00			P	
	Cyanide	0.56	U		CA	

or Before: BROWN

Clarity Before:

Texture: FINE

or After: BROWN

Clarity After:

Artifacts:

ments:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX972

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

ix (soil/water): SOIL

Lab Sample ID: 06107-095

el (low/med): LOW

Date Received: 06/10/92

olids: 80.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	4300.00			P	
7440-36-0	Antimony	3.80	U	N	P	W
7440-38-2	Arsenic	71.80		*	F	J
7440-39-3	Barium	97.60			P	
7440-41-7	Beryllium	0.36	B		P	
7440-43-9	Cadmium	0.74	B		P	
7440-70-2	Calcium	17900.00		*	P	J
7440-47-3	Chromium	9.70			P	
7440-48-4	Cobalt	8.30	B		P	
7440-50-8	Copper	3880.00		N*	P	J
7439-89-6	Iron	24100.00			P	
7439-92-1	Lead	141.00		*	F	J
7439-95-4	Magnesium	5910.00			P	
7439-96-5	Manganese	776.00		N	P	J
7439-97-6	Mercury	0.11	U		CV	
7440-02-0	Nickel	5.20	B		P	J
7440-09-7	Potassium	1540.00			P	
7782-49-2	Selenium	0.96	U	WN	F	W
7440-22-4	Silver	6.60			P	
7440-23-5	Sodium	72.20	B		P	J
7440-28-0	Thallium	0.48	U		F	
7440-62-2	Vanadium	14.60			P	
7440-66-6	Zinc	272.00			P	
	Cyanide	0.58	U		CA	

or Before: BROWN

Clarity Before:

Texture: FINE

or After: BROWN

Clarity After:

Artifacts:

ments:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX973

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-00-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

Matrix (soil/water): SOIL

Lab Sample ID: 06107-10S

pH (low/med): LOW

Date Received: 06/10/92

Solids: 74.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	13700.00			P	
7440-36-0	Antimony	4.10	U	N	P	UJ
7440-38-2	Arsenic	10.40		*	F	J
7440-39-3	Barium	214.00			P	
7440-41-7	Beryllium	0.88	B		P	
7440-43-9	Cadmium	0.52	U		P	
7440-70-2	Calcium	36900.00		*	P	J
7440-47-3	Chromium	13.00			P	
7440-48-4	Cobalt	8.20	B		P	
7440-50-8	Copper	91.30		N*	P	J
7439-89-6	Iron	15900.00			P	
7439-92-1	Lead	110.00		S*	F	J
7439-95-4	Magnesium	9980.00			P	
7439-96-5	Manganese	508.00		N	P	J
7439-97-6	Mercury	0.11	U		CV	
7440-02-0	Nickel	13.50			P	
7440-09-7	Potassium	4720.00			P	
7782-49-2	Selenium	5.00	U	N	F	UJ
7440-22-4	Silver	1.40	B		P	J
7440-23-5	Sodium	219.00	B		P	J
7440-28-0	Thallium	0.50	U		F	
7440-62-2	Vanadium	25.60			P	
7440-66-6	Zinc	124.00			P	
	Cyanide	0.67	U		CA	

Color Before: BROWN

Clarity Before:

Texture: FINE

Color After: BROWN

Clarity After:

Artifacts:

Comments:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX974

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

Matrix (soil/water): SOIL

Lab Sample ID: 06107-11S

Level (low/med): LOW

Date Received: 06/10/92

Solids: 81.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	5310.00			P	
7440-36-0	Antimony	3.90	U	N	P	UJ
7440-38-2	Arsenic	78.90		*	F	J
7440-39-3	Barium	125.00			P	
7440-41-7	Beryllium	0.41	B		P	
7440-43-9	Cadmium	0.49	U		P	
7440-70-2	Calcium	17400.00		*	P	J
7440-47-3	Chromium	19.20			P	
7440-48-4	Cobalt	3.10	B		P	
7440-50-8	Copper	229.00		N*	P	J
7439-89-6	Iron	48100.00			P	
7439-92-1	Lead	47.50		S*	F	J
7439-95-4	Magnesium	4330.00			P	
7439-96-5	Manganese	90.70		N	P	J
7439-97-6	Mercury	0.11	U		CV	
7440-02-0	Nickel	5.10	B		P	J
7440-09-7	Potassium	4480.00			P	
7782-49-2	Selenium	0.90	U	N	F	UJ
7440-22-4	Silver	4.10			P	J
7440-23-5	Sodium	806.00	B		P	J
7440-28-0	Thallium	0.45	U		F	
7440-62-2	Vanadium	16.40			P	
7440-66-6	Zinc	37.60			P	
	Cyanide	0.60	U		CA	

Color Before: BROWN

Clarity Before:

Texture: FINE

Color After: BROWN

Clarity After:

Artifacts:

Comments:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX975

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

ix (soil/water): SOIL

Lab Sample ID: 06107-12S

el (low/med): LOW

Date Received: 06/10/92

olids: 75.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	7020.00			P	
7440-36-0	Antimony	3.90	U	N	P	UJ
7440-38-2	Arsenic	148.00		*	F	J
7440-39-3	Barium	57.90			P	
7440-41-7	Beryllium	0.65	B		P	
7440-43-9	Cadmium	3.00			P	
7440-70-2	Calcium	74200.00		*	P	J
7440-47-3	Chromium	18.80			P	
7440-48-4	Cobalt	19.90			P	
7440-50-8	Copper	17400.00		N*	P	J
7439-89-6	Iron	56100.00			P	
7439-92-1	Lead	90.60		S*	F	J
7439-95-4	Magnesium	13000.00			P	
7439-96-5	Manganese	3420.00		N	P	J
7439-97-6	Mercury	0.13	U		CV	
7440-02-0	Nickel	8.70	B		P	J
7440-09-7	Potassium	793.00	B		P	
7782-49-2	Selenium	2.60		SN	F	J
7440-22-4	Silver	24.40			P	
7440-23-5	Sodium	72.20	B		P	J
7440-28-0	Thallium	0.53	U		F	
7440-62-2	Vanadium	17.00			P	
7440-66-6	Zinc	1040.00			P	
	Cyanide	0.66	U		CA	

or Before: BROWN

Clarity Before:

Texture: FINE

or After: BROWN

Clarity After:

Artifacts:

ments:

## U.S. EPA - CLP

1

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX976

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

Matrix (soil/water): SOIL

Lab Sample ID: 06107-13S

Level (low/med): LOW

Date Received: 06/10/92

Solids: 75.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	6960.00			P	
7440-36-0	Antimony	3.90	U	N	P	UJ
7440-38-2	Arsenic	36.10		*	F	J
7440-39-3	Barium	112.00			P	
7440-41-7	Beryllium	0.34	B		P	
7440-43-9	Cadmium	0.49	U		P	
7440-70-2	Calcium	6760.00		*	P	J
7440-47-3	Chromium	13.90			P	
7440-48-4	Cobalt	6.90	B		P	
7440-50-8	Copper	1310.00		N*	P	J
7439-89-6	Iron	34200.00			P	
7439-92-1	Lead	40.30		S*	F	J
7439-95-4	Magnesium	5690.00			P	
7439-96-5	Manganese	368.00		N	P	J
7439-97-6	Mercury	0.11	U		CV	
7440-02-0	Nickel	7.40	B		P	J
7440-09-7	Potassium	2650.00			P	
7782-49-2	Selenium	0.98	U	WN	F	UJ
7440-22-4	Silver	5.20			P	
7440-23-5	Sodium	108.00	B		P	J
7440-28-0	Thallium	0.49	U		F	
7440-62-2	Vanadium	19.90			P	
7440-66-6	Zinc	103.00			P	
	Cyanide	0.65	U		CA	

Color Before: BROWN

Clarity Before:

Texture: COARSE

Color After: BROWN

Clarity After:

Artifacts:

Comments:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX977

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

ix (soil/water): SOIL

Lab Sample ID: 06107-14S

el (low/med): LOW

Date Received: 06/10/92

olids: 76.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	6860.00			P	
7440-36-0	Antimony	3.90	U	N	P	U
7440-38-2	Arsenic	22.00		*	F	J
7440-39-3	Barium	85.20			P	
7440-41-7	Beryllium	0.47	B		P	
7440-43-9	Cadmium	0.49	U		P	
7440-70-2	Calcium	32100.00		*	P	J
7440-47-3	Chromium	11.00			P	
7440-48-4	Cobalt	7.20	B		P	
7440-50-8	Copper	3740.00		N*	P	J
7439-89-6	Iron	27900.00			P	
7439-92-1	Lead	50.10		S*	F	J
7439-95-4	Magnesium	6610.00			P	
7439-96-5	Manganese	334.00		N	P	J
7439-97-6	Mercury	0.11	U		CV	
7440-02-0	Nickel	6.40	B		P	J
7440-09-7	Potassium	1990.00			P	
7782-49-2	Selenium	4.80	U	WN	F	U
7440-22-4	Silver	5.40			P	
7440-23-5	Sodium	1010.00	B		P	J
7440-28-0	Thallium	0.48	U		F	
7440-62-2	Vanadium	13.90			P	
7440-66-6	Zinc	73.30			P	
	Cyanide	0.60	U		CA	

or Before: GREY

Clarity Before:

Texture: COARSE

or After: GREY

Clarity After:

Artifacts:

ments:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX978

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX964

Matrix (soil/water): SOIL

Lab Sample ID: 06107-155

pH (low/med): LOW

Date Received: 06/10/92

Solids: 74.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	4920.00			P	
7440-36-0	Antimony	4.00	U	N	P	U
7440-38-2	Arsenic	31.50		*	F	J
7440-39-3	Barium	52.60			P	
7440-41-7	Beryllium	0.29	B		P	
7440-43-9	Cadmium	0.49	U		P	
7440-70-2	Calcium	11700.00		*	P	J
7440-47-3	Chromium	4.80			P	
7440-48-4	Cobalt	8.10	B		P	
7440-50-8	Copper	3970.00		N*	P	J
7439-89-6	Iron	30700.00			P	
7439-92-1	Lead	31.00		*	F	J
7439-95-4	Magnesium	8740.00			P	
7439-96-5	Manganese	417.00		N	P	J
7439-97-6	Mercury	0.13	U		CV	
7440-02-0	Nickel	4.70	B		P	U
7440-09-7	Potassium	1430.00			P	
7782-49-2	Selenium	0.99	U	WN	F	U
7440-22-4	Silver	7.00			P	
7440-23-5	Sodium	167.00	B		P	J
7440-28-0	Thallium	0.49	U		F	
7440-62-2	Vanadium	10.00	B		P	
7440-66-6	Zinc	71.10			P	
	Cyanide	0.67	U		CA	

Color Before: GREY

Clarity Before:

Texture: COARSE

Color After: GREY

Clarity After:

Artifacts:

Comments:



13  
PREPARATION LOG

Contract: 68-00-0109

Case No. : 18254

SAS No. :

SDG No. : MHX964

[illegible]

U.S. EPA - CLF

1

EPA SAMPLE NO.

## INORGANIC ANALYSIS DATA SHEET

MHX979

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 13254

SAS No.:

SDG No.: MHX979

Matrix (soil/water): WATER

Lab Sample ID: 06109-01S

Level (low/med): LOW

Date Received: 06/10/92

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	1140000.00			P	
7440-36-0	Antimony	1100.00	U	N	P	R
7440-38-2	Arsenic	10.00	U	WN*	F	<del>X</del> R
7440-39-3	Barium	5.00	U	N	P	R
7440-41-7	Beryllium	382.00	B		P	
7440-43-9	Cadmium	713.00			P	
7440-70-2	Calcium	507000.00			P	
7440-47-3	Chromium	869.00	B	*N	P	<del>X</del> R
7440-48-4	Cobalt	6360.00			P	
7440-50-8	Copper	8210000.00			P	
7439-89-6	Iron	29000.00		*	P	J
7439-92-1	Lead	19.00	U	WN	F	R
7439-95-4	Magnesium	3140000.00			P	
7439-96-5	Manganese	430000.00			P	
7439-97-6	Mercury	1.00		*	CV	J
7440-02-0	Nickel	5490.00			P	
7440-09-7	Potassium	314.00	B		P	
7782-49-2	Selenium	40.00	U	WN	F	R
7440-22-4	Silver	300.00	U		P	
7440-23-5	Sodium	50200.00			P	
7440-28-0	Thallium	11.10	B	W	F	J
7440-62-2	Vanadium	200.00	U	N	P	R
7440-66-6	Zinc	75600.00			P	
	Cyanide	10.00	U		CA	UJ

Color Before: GREEN

Clarity Before: CLOUDY

Texture:

Color After: GREEN

Clarity After: CLOUDY

Artifacts:

Comments:

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX980

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX979

Matrix (soil/water): WATER

Lab Sample ID: 06109-02S

Level (low/med): LOW

Date Received: 06/10/92

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	760000.00			P	
7440-36-0	Antimony	1100.00	U	N	P	R
7440-38-2	Arsenic	10.00	U	WN*	F	X R
7440-39-3	Barium	5.00	U	N	P	R
7440-41-7	Beryllium	255.00	B		P	
7440-43-9	Cadmium	537.00			P	
7440-70-2	Calcium	535000.00			P	
7440-47-3	Chromium	737.00	B	N*	P	X R
7440-48-4	Cobalt	4230.00			P	
7440-50-8	Copper	1010000.00			P	
7439-89-6	Iron	76400.00		*	P	J
7439-92-1	Lead	9.50	U	WN	F	R
7439-95-4	Magnesium	2070000.00			P	
7439-96-5	Manganese	190000.00			P	
7439-97-6	Mercury	0.77		*	CV	J
7440-02-0	Nickel	3380.00			P	
7440-09-7	Potassium	743.00	B		P	
7782-49-2	Selenium	20.00	U	WN	F	R
7440-22-4	Silver	300.00	U		P	
7440-23-5	Sodium	9900.00			P	
7440-28-0	Thallium	8.50	B		F	J
7440-62-2	Vanadium	200.00	U	N	P	R
7440-66-6	Zinc	53300.00			P	
	Cyanide	10.00	U		CA	UJ

Color Before: GREEN

Clarity Before: CLOUDY

Texture:

Color After: GREEN

Clarity After: CLOUDY

Artifacts:

Comments:

003

## U.S. EPA - CLP

1

## INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX981

Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX979

rix (soil/water): WATER

Lab Sample ID: 06109-03S

el (low/med): LOW

Date Received: 06/10/92

olids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	28.80	B		P
7440-36-0	Antimony	11.00	U	N	P R
7440-38-2	Arsenic	2.00	U	N*	F <del>X</del> R
7440-39-3	Barium	5.00	U	N	P R
7440-41-7	Beryllium	1.00	U		P
7440-43-9	Cadmium	1.00	U		P
7440-70-2	Calcium	28.00	U		P
7440-47-3	Chromium	5.00	U	N*	P <del>X</del> R
7440-48-4	Cobalt	2.00	U		P
7440-50-8	Copper	11.10	B		P <del>UJ</del>
7439-89-6	Iron	25.00	U	*	P <del>UJ</del>
7439-92-1	Lead	2.40	B	WN	F R
7439-95-4	Magnesium	96.50	B		P
7439-96-5	Manganese	1.00	U		P
7439-97-6	Mercury	0.20	U	*	CV <del>UJ</del>
7440-02-0	Nickel	5.00	U		P
7440-09-7	Potassium	194.00	U		P
7782-49-2	Selenium	4.00	U	N	F R
7440-22-4	Silver	3.00	U		P
7440-23-5	Sodium	191.00	B		P <del>UJ</del>
7440-28-0	Thallium	1.00	U		F
7440-62-2	Vanadium	2.00	U	N	P R
7440-66-6	Zinc	8.00	U		P
	Cyanide	10.00	U		CA <del>UJ</del>

or Before: COLORLESS

Clarity Before: CLEAR

Texture:

or After: COLORLESS

Clarity After: CLEAR

Artifacts:

ments:

## U.S. EPA - CLP

1  
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHX982

b Name: SKINNER &amp; SHERMAN LABS.

Contract: 68-D0-0109

b Code: SKINER

Case No.: 18254

SAS No.:

SDG No.: MHX979

trix (soil/water): WATER

Lab Sample ID: 06109-04S

vel (low/med): LOW

Date Received: 06/10/92

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	21.00	U		P	
7440-36-0	Antimony	11.00	U	N	P	R
7440-38-2	Arsenic	5.80	B	N*	F	X R
7440-39-3	Barium	109.00	B	N	P	R
7440-41-7	Beryllium	1.00	U		P	
7440-43-9	Cadmium	1.00	B		P	UJ
7440-70-2	Calcium	45300.00			P	
7440-47-3	Chromium	5.00	U	N*	P	X R
7440-48-4	Cobalt	2.00	U		P	
7440-50-8	Copper	6.40	B		P	UJ
7439-89-6	Iron	447.00		*	P	J
7439-92-1	Lead	1.90	U	WN	F	R
7439-95-4	Magnesium	11500.00			P	
7439-96-5	Manganese	26.40			P	U
7439-97-6	Mercury	0.20	U	*	CV	UJ
7440-02-0	Nickel	5.00	U		P	
7440-09-7	Potassium	3110.00	B		P	
7782-49-2	Selenium	4.00	U	WN	F	R
7440-22-4	Silver	3.00	U		P	
7440-23-5	Sodium	39500.00			P	
7440-28-0	Thallium	5.00	U	W	F	UJ
7440-62-2	Vanadium	7.60	B	N	P	R
7440-66-6	Zinc	207.00			P	
	Cyanide	10.00	U		CA	UJ

lor Before: COLORLESS

Clarity Before: CLEAR

Texture:

lor After: COLORLESS

Clarity After: CLEAR

Artifacts:

mments:

**Appendix H.**  
**Utah State Health Laboratory**  
**Analytical Results**

Cost Code:

EPA METHOD 625 (GC/MS)

Set # 1003627  
Lab #

Base Neutral/Acid Extractables

Send Report To: DEQ-DEER WATER

Attn: Jason Knowlton  
1950 W. W. Temple  
S.L.C., UT 84116Utah State Dept of Health  
44 Medical Drive  
Salt Lake City, UT 84113

Field # EC-SC-01 Date/Time Collected 6/3/92 1420 Sample Matrix 0.1

Collected By Jason Knowlton Sampling Site Essex Copper

Exact Description of Sampling Point W. Drum Storage Rec 6/10/92

Analyst J. Oman Date Rec'd Date Analyzed 7/30/92  
Aliquot Sample Extracted 0.5g Final Extract Volume 10 ml  
extracted 6/16/92

(MDL based on 1 L. extracted, 1 ml final volume)

in ug/L ug/kg		in ug/L ug/kg	
MDL/Results		MDL/Results	
X Name		X Name	
Acenaphthene	1.0	Naphthalene	1.0
Acenaphthylene	2.0	2-Nitroaniline	16.0
Anthracene	3.0	3-Nitroaniline	16.0
Aniline	4.0	4-Nitroaniline	31.0
Benzidene	82.0	Nitrobenzene	3.0
Benzo(a)anthracene	7.0	2-Nitrophenol	4.0
Benzo(b)fluoranthene	7.0	4-Nitrophenol	18.0
Benzo(k)fluoranthene	4.0	n-Nitrosodimethylamine	8.0
Benzo(a)pyrene	11.0	n-Nitrosodiphenylamine	4.0
Benzo(ghi)perylene	13.0	n-Nitrosodipropylamine	6.0
Benzylbutylphthalate	7.0	Pentachlorophenol	29.0
Benzyl alcohol	17.0	Phenanthrene	1.0
Benzoic acid	32.0	Phenol	3.0
Bis(2-chloroethyl)ether	3.0	Pyrene	4.0
Bis(2-chloroethoxy)methane	3.0	1,2,4-Trichlorobenzene	2.0
Bis(2-chloroisopropyl)ether	3.0	2,4,6-Trichlorophenol	4.0
Bis(2-ethylhexyl)phthalate	10.0	2,4,6-Trichlorophenol	4.0
4-Bromophenyl phenyl ether	6.0		
4-Chloraniline	9.0		
2-Chloronaphthalene	2.0		
4-Chloro-3-methyl phenol	6.0		
2-Chlorophenol	2.0		
4-Chlorophenyl phenyl ether	4.0		
Chrysene	3.0		
Dibenz(a,h)anthracene	19.0		
Dibenzofuran	2.0		
Di-n-butyl phthalate	5.0		
1,3-Dichlorobenzene (meta)	2.0		
1,2-Dichlorobenzene (ortho)	5.0		
1,4-Dichlorobenzene (para)	1.0		
3,3-Dichlorobenzidene	24.0		
2,4-Dichlorophenol	4.0		
2,4-Dimethylphenol	6.0		
Diethyl phthalate	4.0		
2,4-Dinitrophenol	31.0		
Dimethyl phthalate	3.0		
2,4-Dinitrotoluene	14.0		
2,6-Dinitrotoluene	10.0		
Di-n-octyl phthalate	8.0		
1,2-Diphenylhydrazine	3.0		
Fluoranthene	5.0		
Fluorene	2.0		
Hexachlorobenzene	6.0		
Hexachlorobutadiene	4.0		
Hexachloroethane	2.0		
Hexachlorocyclopentadiene	21.0		
Indeno(1,2,3-c,d)pyrene	16.0		
Isophorone	3.0		
2-Methyl-4,6-dinitrophenol	24.0		
2-Methyl naphthalene	3.0		
2-Methyl phenol (o-cresol)	3.0		
3-Methyl phenol (m-cresol)	10.0		
4-Methyl phenol (p-cresol)	4.0		

TENTATIVELY IDENTIFIED COMPOUND  
Name Scan # ResultsUTAH DEPARTMENT OF  
ENVIRONMENTAL QUALITY

AUG 12 1992

DIV. OF ENVIRONMENTAL  
RESPONSE AND REMEDIATION

CHAIN OF CUSTODY

- U - Analyzed for but not detected.  
J - An estimated value for a tentatively identified compd OR a value less than the detection limit but greater than zero.  
B - Found in the blank.

Cost Code:

EPA METHOD 624 (GC/MS)  
Purgeables

Lab # 92003627

Send Report To: DEQ - DERR  
Attn: Jason Knowlton  
1950 W N. Temple  
S.L.C., UT 84116Utah State Dept of Health  
44 Medical Drive  
Salt Lake City, UT 84113Field # EC-5C-01 Date/Time Collected 6/13/92 1420 Sample Matrix Oil  
Collected By Jason Knowlton Sampling Site Essex Copper  
Exact Description of Sampling Point W. Drum StorageAnalyst J. Oman Date Rec'd 6/16/92 Date Analyzed 7/21/92  
Amt. Purged .02g (MDL based on 5ml purge vol.) Dilution 150

X	Name	ug/L or ug/Kg	MDL/RESULTS
	Acetone	7.0	X 250
	Acrolein	10.0	
	Acrylonitrile	10.0	
	Benzene	1.0	
	Bromodichloromethane	1.0	
	Bromoform	1.0	
	Bromomethane	2.0	
	2-Butanone (MEK)	4.0	
	Carbon Disulfide	2.0	
	Carbon Tetrachloride	1.0	
	Chlorobenzene	1.0	
	Chloroethane	2.0	✓
	2-Chloroethylvinylether	5.0	X 250
	Chloroform	2.0	
	Chloromethane	5.0	
	Cyclohexane	2.0	
	Dibromochloromethane	1.0	
	1,2-Dichlorobenzene (ortho)	1.0	
	1,3-Dichlorobenzene (meta)	1.0	
	1,4-Dichlorobenzene (para)	1.0	
	1,1-Dichloroethane	1.0	
	1,2-Dichloroethane	1.0	
	1,1-Dichloroethene	1.0	
	trans-1,2-Dichloroethene	3.0	
	1,2-Dichloropropane	1.0	
	cis-1,3-Dichloropropene	1.0	
	trans-1,3-Dichloropropene	1.0	
	Ethyl Benzene	1.0	
	2-Hexanone (Methyl n-butyl ketone)	3.0	
	Isobutanol	5.0	
	Methylene Chloride (Dichloromethane)	1.0	
	4-Methyl-2-Pentanone (MIBK)	2.0	
	Styrene	1.0	
	1,1,2,2-Tetrachloroethane	1.0	
	Tetrachloroethene (PCE)	1.0	
	Toluene	1.0	
	1,1,1-Trichloroethane (Methyl Chloroform)	1.0	
	1,1,2-Trichloroethane	1.0	
	Trichloroethene (TCE)	1.0	
	Trichlorofluoromethane (Freon 11)	2.0	
	Vinyl Acetate	4.0	
	Vinyl Chloride	2.0	
	Total Xylenes	1.0	✓

U - Analyzed for but not detected.

J - An estimated value for a tentatively identified compd OR a value less than the detection limit but greater than zero

B - Found in the blank.

Tentatively Identified Compounds  
Name Scan # Results

CHAIN OF CUSTODY

Preparation and Analysis By: \_\_\_\_\_

To \_\_\_\_\_ Date 7/21R \_\_\_\_\_ Date 8/12



EPA METHODS 608, 8140, 8150  
For Gas Chromatography

Jun 18 92 003627

608-PCB'S and Organochlorine Pesticides  
8140-Organophosphorous Pesticides  
8150-Pesticides (PLEASE PRINT)

LAB NO. \_\_\_\_\_

Send Report To

Name or Agency: DEQ-DERR Attn. Jason Knowlton

Address: 1950 W. N. Temple

City, State, Zip: S.L.C. UT 84116

Phone Number: 536-4100

STATE OF UTAH, DEPT OF HEALTH  
DIVISION OF LABORATORY SERVICES  
46 North MEDICAL DRIVE  
Salt Lake City, Utah 84113  
(801)584-8400

COST CODE \_\_\_\_\_

SAMPLE USED FOR: Site Investigation

SAMPLE MATRIX O.I.

Field # EC-56-01 Date Collected 6/3/92 Time Collected (24hr. clock) 1420

Collected By Jason Knowlton Sampling Site Essex Copper Processing Plant

Exact Description of Sampling Point W. Drum Storage Area - Drum #13

Analyst J. Oman Date Rec'd \_\_\_\_\_ Date Analyzed 6/19/92

Aliquot Sample Extracted 0.11g Final Volume Extract 10ml

(MDL based on 1 L extraction and 10 ml final Volume)

☒ Analyze for Method 608 Analytes (PCB only)

\_\_\_\_\_ Analyze for Method 8140 Analytes

\_\_\_\_\_ Analyze for Method 8150 Analytes

\_\_\_\_\_ Analyze for PCB'S Only

\_\_\_\_\_ Analyze only those Analytes Indicated(X)

608 in ug/L

8140 in ug/L

X Name	MDL/RESULTS
Aldrin	0.004U
alpha-BHC	0.003U
beta-BHC	0.00U
delta-BHC	0.009U
gamma-BHC (Lindane)	0.00U
Chlordane	0.014U
4,4'-DDD	0.011U
4,4'-DDE	0.004U
4,4'-DDT	0.012U
Dieldrin	0.002U
Endosulfan I	0.014U
Endosulfan II	0.004U
Endosulfan Sulfate	0.066U
Endrin	0.006U
Endrin Aldehyde	0.023U
Endrin Keytone	nd
Heptachlor	0.003U
Heptachlor Epoxide	0.083U
Toxaphene	0.24U

X Name	MDL/RESULTS
Ethyl Parathion	nd
Diazinon	0.6U
Malathion	nd

8150 in ug/L

X Name	MDL/RESULTS
2,4-D (2,4Dichlorophenoxyacetic acid)	1.0U
2,4,5-TP (SILVEX)	0.1U

608 PCB'S in ug/L PPM

X Name	MDL/RESULTS
Aroclor 1016	nd
Aroclor 1221	nd
Aroclor 1232	nd
Aroclor 1242	0.065U
Aroclor 1248	nd
Aroclor 1254	nd
Aroclor 1260	nd

*None detected  
< 11 ppm*

U - Analyzed for but not detected  
J - A value less than the detection limit but greater than zero  
B - Found in the blank  
nd - Not Determined

Analysis Certified By \_\_\_\_\_

Date 6/24

LAB USE ONLY: 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28  
29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57

BOTTLES REQUIRED: FOR 608-8140-8150: (1) one gallon glass **AMBER** bottle

FOR PCB'S: Water:same as above/ SOIL: (1) 4 oz GLASS BOTTLE/

OIL: (1) 1.5 DRAM GLASS VIAL(VERY SMALL) ALL LIDS MUST BE LINED WITH TEFLON

CHAIN OF CUSTODY

## EPA METHODS 608, 8140, 8150

For Gas Chromatography

608-PCB'S and Organochlorine Pesticides

8140-Organophosphorous Pesticides

8150-Pesticides (PLEASE PRINT)

Send Report To

Name or Agency: DEQ-DERR, Attn. Jason KnowltonAddress: 1750 W. N. TempleCity, State, Zip: S.L.C. UT 84116Phone Number: 536-4100SAMPLE USED FOR: Site Investigation

LAB NO.

JUN 10 1992 003628

STATE OF UTAH, DEPT OF HEALTH  
DIVISION OF LABORATORY SERVICES  
46 North MEDICAL DRIVE  
Salt Lake City, Utah 84113  
(801)584-8400

COST CODE

SAMPLE MATRIX 0:1Field # EC-SC-02 Date Collected 6/3/92 Time Collected (24hr. clock) 1520Collected By Jason Knowlton Sampling Site Essex CopperExact Description of Sampling Point E. Transformer AreaAnalyst J. Oman Date Rec'd \_\_\_\_\_ Date Analyzed 6/19/92Aliquot Sample Extracted 0.10g Final Volume Extract 10ml

(MDL based on 1 L extraction and 10 ml final Volume)

☒ Analyze for Method 608 Analytes (PCB only) ☐ Analyze for Method 8140 Analytes  
☐ Analyze for Method 8150 Analytes ☐ Analyze for PCB'S Only  
☐ Analyze only those Analytes Indicated(X)

608 in ug/L

X Name	MDL/RESULTS
Aldrin	0.004U
alpha-BHC	0.003U
beta-BHC	0.00U
delta-BHC	0.009U
gamma-BHC (Lindane)	0.00U
Chlordane	0.014U
4,4'-DDD	0.011U
4,4'-DDE	0.004U
4,4'-DDT	0.012U
Dieldrin	0.002U
Endosulfan I	0.014U
Endosulfan II	0.004U
Endosulfan Sulfate	0.066U
Endrin	0.006U
Endrin Aldehyde	0.023U
Endrin Keytone	nd
Heptachlor	0.003U
Heptachlor Epoxide	0.083U
Toxaphene	0.24U

8140 in ug/L

X Name	MDL/RESULTS
Ethyl Parathion	nd
Diazinon	0.6U
Malathion	nd

8150 in ug/L

X Name	MDL/RESULTS
2,4-D (2,4Dichlorophenoxyacetic acid)	1.0U
2,4,5-TP (SILVEX)	0.1U

608 PCB'S in ug/L ppm

X Name	MDL/RESULTS
Aroclor 1016	nd
Aroclor 1221	nd
Aroclor 1232	nd
Aroclor 1242	0.065U
Aroclor 1248	nd
Aroclor 1254	nd
Aroclor 1260	nd

None detected  
 < 11 ppm

U - Analyzed for but not detected  
 J - A value less than the detection limit but greater than zero  
 B - Found in the blank  
 nd - Not Determined

CHAIN OF CUSTODY

Analysis Certified By JZ Date 6/24

LAB USE ONLY: 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57

BOTTLES REQUIRED: FOR 608-8140-8150: (1) one gallon glass AMBER bottle

FOR PCB'S: Water: same as above/ SOIL: (1) 4 oz GLASS BOTTLE/

OIL: (1) 1.5 DRAM GLASS VIAL (VERY SMALL) ALL LIDS MUST BE LINED WITH TEFLON

CHAIN OF CUSTODY

EPA METHODS 608, 8140, 8150  
For Gas Chromatography

July 1992 003629

608-PCB'S and Organochlorine Pesticides  
8140-Organophosphorous Pesticides  
8150-Pesticides (PLEASE PRINT)

LAB NO. \_\_\_\_\_

Send Report To

Name or Agency: DEQ-DEAR, Attn: Jason Knowlton

Address: 1950 W. N. Temple

City, State, Zip: S.L.C. UT 84116

Phone Number: 536-4100

STATE OF UTAH, DEPT OF HEALTH  
DIVISION OF LABORATORY SERVICES  
46 North MEDICAL DRIVE  
Salt Lake City, Utah 84113  
(801)584-8400

COST CODE \_\_\_\_\_

SAMPLE USED FOR: Site Investigation

SAMPLE MATRIX Oil

Field # EC-SC-03 Date Collected 6/3/92 Time Collected (24hr. clock) 1535

Collected By Jason Knowlton Sampling Site Essex Copper

Exact Description of Sampling Point W. Transformer Area

Analyst J. Oman Date Rec'd \_\_\_\_\_ Date Analyzed 6/19/92

Aliquot Sample Extracted 0.10g Final Volume Extract 10ml

(MDL based on 1 L extraction and 10 ml final Volume)

☒ Analyze for Method 608 Analytes (PCB Only)

\_\_\_\_\_ Analyze for Method 8140 Analytes

\_\_\_\_\_ Analyze for Method 8150 Analytes

\_\_\_\_\_ Analyze for PCB'S Only

\_\_\_\_\_ Analyze only those Analytes Indicated(X)

608 in ug/L

X Name	MDL/RESULTS
Aldrin	0.004U
alpha-BHC	0.003U
beta-BHC	0.00U
delta-BHC	0.009U
gamma-BHC (Lindane)	0.00U
Chlordane	0.014U
4,4'-DDP	0.011U
4,4'-DDE	0.004U
4,4'-DDT	0.012U
Dieldrin	0.002U
Endosulfan I	0.014U
Endosulfan II	0.004U
Endosulfan Sulfate	0.066U
Endrin	0.006U
Endrin Aldehyde	0.023U
Endrin Keytone	nd
Heptachlor	0.003U
Heptachlor Epoxide	0.083U
Toxaphene	0.24U

8140 in ug/L

X Name	MDL/RESULTS
Ethyl Parathion	nd
Diazinon	0.6U
Malathion	nd

8150 in ug/L

X Name	MDL/RESULTS
2,4-D (2,4Dichlorophenoxyacetic acid)	1.0U
2,4,5-TP (SILVEX)	0.1U

608 PCB'S in ug/L PPM 10.

X Name	MDL/RESULTS
Aroclor 1016	nd
Aroclor 1221	nd
Aroclor 1232	nd
Aroclor 1242	0.065U
Aroclor 1248	nd
Aroclor 1254	nd
Aroclor 1260	nd 1900.

U - Analyzed for but not detected  
J - A value less than the detection limit but greater than zero  
B - Found in the blank  
nd - Not Determined

CHAIN OF CUSTODY

Analysis Certified By RL

Date 6/24

LAB USE ONLY: 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28  
29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57

BOTTLES REQUIRED: FOR 608-8140-8150: (1) one gallon glass AMBER bottle

FOR PCB'S: Water: same as above/ SOIL: (1) 4 oz GLASS BOTTLE/

OIL: (1) 1.5 DRAM GLASS VIAL (VERY SMALL) ALL LIDS MUST BE LINED WITH TEFLON

CHAIN OF CUSTODY

Appendix I.  
Dow Chemical  
Material Safety Data Sheets



# Material Safety Data Sheet

**Dow U.S.A.**

The Dow Chemical Company  
Midland Michigan 48674  
Emergency 517 · 636-4400

Product Code: 23586

Page: 1

Product Name: DOWFROTH (R) 250 FLOTATION FROTHER

Effective Date: 06/19/90 Date Printed: 12/23/92

MSDS:002010

## 1. INGREDIENTS: (% w/w, unless otherwise noted)

Polypropylene glycol methyl ether CAS# 037286-64-9 98%

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

## 2. PHYSICAL DATA:

BOILING POINT: 473F, 245C  
VAP PRESS: <0.01 mmHg @ 20C  
VAP DENSITY: Low  
SOL. IN WATER: Completely miscible.  
SP. GRAVITY: 0.98 25/25  
APPEARANCE: Amber liquid.  
ODOR: Not available.

## 3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: 300F, 149C  
METHOD USED: Setaflash

FLAMMABLE LIMITS  
LFL: Not determ.  
UFL: Not determ.

EXTINGUISHING MEDIA: Water fog, alcohol resistant foam, CO2, dry chemical.

FIRE & EXPLOSION HAZARDS: No data available.

FIRE-FIGHTING EQUIPMENT: Wear positive pressure self-contained

(Continued on page 2)

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**Dow Chemical U.S.A.\* Midland, MI 48674 Emergency Phone: 517-636-4400**

Product Code: 23586

Page: 2

**Product Name: DOWFROTH (R) 250 FLOTATION FROTHER**

Effective Date: 06/19/90 Date Printed: 12/23/92

MSDS:002010

### **3. FIRE AND EXPLOSION HAZARD DATA: (CONTINUED)**

breathing apparatus.

### **4. REACTIVITY DATA:**

STABILITY: (CONDITIONS TO AVOID) Will not decompose under ordinary conditions of use and storage.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Oxidizing material.

HAZARDOUS DECOMPOSITION PRODUCTS: On burning, carbon monoxide and carbon dioxide are expected.

HAZARDOUS POLYMERIZATION: Will not occur.

### **5. ENVIRONMENTAL AND DISPOSAL INFORMATION:**

ACTION TO TAKE FOR SPILLS/LEAKS: (Use appropriate safety equipment): Contain, do not allow to contaminate ground water. Absorb if possible.

DISPOSAL METHOD: Dispose in accordance with all federal, state and local regulations. Incineration is preferred.

### **6. HEALTH HAZARD DATA:**

EYE: May cause moderate eye irritation. May cause moderate corneal injury.

SKIN CONTACT: Prolonged or repeated exposure not likely to cause significant skin irritation.

(Continued on page 3)

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**Dow Chemical U.S.A.\* Midland, MI 48674 Emergency Phone: 517-636-4400**

Product Code: 23586

Page: 3

**Product Name: DOWFROTH (R) 250 FLOTATION FROTHER**

Effective Date: 06/19/90 Date Printed: 12/23/92

MSDS:002010

## **6. HEALTH HAZARD DATA: (CONTINUED)**

**SKIN ABSORPTION:** A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. The dermal LD50 has not been determined. Repeated exposure to large amounts of some components in this mixture may cause narcotic effects (drowsiness).

**INGESTION:** Single dose oral toxicity is low. The oral LD50 for female rats is between 1260 and 2520 mg/kg. Amounts ingested incidental to industrial handling are not likely to cause injury; however ingestion of larger amounts may cause injury. Observations in animals include tremors and convulsions.

**INHALATION:** Excessive exposure may cause irritation of the eyes, upper respiratory tract, and lungs. Signs and symptoms of excessive exposure may be anesthetic or narcotic effects.

**SYSTEMIC & OTHER EFFECTS:** Signs and symptoms of excessive exposure may be anesthetic or narcotic effects. Repeated excessive exposures may cause liver and possibly kidney effects. Birth defects are unlikely from the tripropylene glycol methyl ether component. Exposures having no adverse effects on the mother should have no effect on the fetus. Results of in vitro mutagenicity studies on tripropylene glycol methyl ether have been negative.

## **7. FIRST AID:**

**EYES:** Irrigate with flowing water immediately and continuously for 15 minutes. Consult medical personnel.

**SKIN:** Wash off in flowing water or shower.

**INGESTION:** Induce vomiting if large amounts are ingested. Consult medical personnel.

(Continued on page 4)

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**Dow Chemical U.S.A.\* Midland, MI 48674 Emergency Phone: 517-636-4400**

Product Code: 23586

Page: 4

**Product Name: DOWFROTH (R) 250 FLOTATION FROTHER**

Effective Date: 06/19/90 Date Printed: 12/23/92

MSDS:002010

## **7. FIRST AID: (CONTINUED)**

**INHALATION:** Remove to fresh air. If not breathing, give mouth-to-mouth resuscitation. If breathing is difficult, give oxygen. Call a physician.

**NOTE TO PHYSICIAN:** No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient. Repeated excessive exposure may aggravate preexisting liver and kidney disease.

## **8. HANDLING PRECAUTIONS:**

**EXPOSURE GUIDELINE(S):** None established.

**VENTILATION:** Good general ventilation should be sufficient for most conditions.

**RESPIRATORY PROTECTION:** When respiratory protection is required for certain operations, use an approved air-purifying respirator.

**SKIN PROTECTION:** No precautions other than clean body-covering clothing should be needed.

**EYE PROTECTION:** Use chemical goggles.

## **9. ADDITIONAL INFORMATION:**

**SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:**  
Practice reasonable care and caution to avoid eye and skin contact.

**MSDS STATUS:** Revised section 9 and regsheets.

For information regarding state/provincial and federal regulations see  
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**Dow Chemical U.S.A.\* Midland, MI 48674 Emergency Phone: 517-636-4400**

Product Code: 23586

Page: R-1

**Product Name: DOWFROTH (R) 250 FLOTATION FROTHER**

Effective Date: 06/19/90 Date Printed: 12/23/92

MSDS:002010

**REGULATORY INFORMATION: (Not meant to be all-inclusive--selected regulations represented.)**

NOTICE: The information herein is presented in good faith and believed to be accurate as the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See MSD Sheet for health and safety information.

**U.S. REGULATIONS**

=====

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

An immediate health hazard

**CANADIAN REGULATIONS**

=====

The Workplace Hazardous Materials Information System (W.H.M.I.S.) Classification for this product is:

D2B

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The Transportation of Dangerous Goods Act (T.D.G.A.) classification for this product is:

(Continued on page R-2)

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**Dow Chemical U.S.A.\* Midland, MI 48674 Emergency Phone: 517-636-4400**

Product Code: 23586

Page: R-2

**Product Name: DOWFROTH (R) 250 FLOTATION FROTHER**

Effective Date: 06/19/90 Date Printed: 12/23/92

MSDS:002010

REGULATORY INFORMATION (CONTINUED)

Not regulated

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The Information Herein Is Given In Good Faith, But No Warranty,  
Express Or Implied, Is Made. Consult The Dow Chemical Company  
For Further Information.

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Appendix J.  
American Cyanamid  
Material Safety Data Sheets

**MATERIAL SAFETY DATA**MSDS NO. 0617-04  
DATE: 08/14/89**PRODUCT IDENTIFICATION**

PRODUCT NAME: **AEROFLOAT® 25 Promoter**  
SYNONYMS: None  
CHEMICAL FAMILY: Aryl dithiophosphoric acid  
MOLECULAR FORMULA: Mixture  
MOLECULAR WGT.: Mixture

**WARNING**

**DANGER! CAUSES BURNS OF EYES AND SKIN  
HARMFUL IF ABSORBED THROUGH SKIN OR SWALLOWED**

**OSHA REGULATED COMPONENTS**

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
Cresylic acid (cresol)	001319-77-3	15	5 ppm (skin)	OSHA/ACGIH

**NFPA HAZARD RATING**

Fire 1  
Health 3 1  
Special 1 Reactivity

**FIRE:** Material that must be preheated before ignition can occur.  
**HEALTH:** Materials which on short exposure could cause serious temporary or residual injury even though prompt medical treatment were given.  
**REACTIVITY:** Materials which in themselves are normally stable, but which can become unstable at elevated temperatures and pressures or which may react with water with some release of energy but not violently.

**HEALTH HAZARD INFORMATION****EFFECTS OF OVEREXPOSURE:**

The acute oral (rat) and the acute dermal (rabbit) LD50 values are 250 mg/kg and between 200 mg/kg and 1000 mg/kg, respectively. Direct contact with this material may cause severe eye and skin irritation.

Contact with water may cause liberation of hydrogen sulfide. Hydrogen sulfide has a strong rotten-egg odor, however, some people are unable to smell the gas and exposure will deaden the sense of smell. Therefore odor is an unreliable indicator of exposure. Overexposure to hydrogen sulfide gas may cause severe eye or respiratory tract irritation, rapid development of coma and respiratory failure. Low levels of hydrogen sulfide may cause headache, dizziness, staggering gait, neurological damage and gastritis.

Toxicology information on regulated components of this product is as follows:

The acute oral (rat) and acute dermal (rabbit) LD50 values for cresol are 1454 mg/kg and 2000 mg/kg, respectively. Cresol is corrosive to all tissues; therefore, the liquid may cause severe eye or skin irritation. Prolonged or repeated dermal contact to low concentrations of cresol may produce a skin rash. Ingestion or skin absorption may cause headache, dizziness, blurred vision, ringing of ears, rapid breathing, mental confusion, muscular weakness, loss of consciousness and liver and kidney

**EMERGENCY PHONE: 201/835-3100**

AMERICAN CYANAMID COMPANY, 1 CYANAMID PLAZA, WAYNE, NEW JERSEY 07470

**AEROFLOAT® 25 Promoter**

damage. Prolonged or repeated contact by any route may produce the following signs: vomiting, difficulty in swallowing, salivation, diarrhea, loss of appetite, headache, faintness, dizziness, mental disturbances, skin rash and liver and kidney damage.

**FIRST AID:**

In case of skin contact, remove contaminated clothing without delay. Wear impervious gloves. Cleanse skin thoroughly with soap and water. Do not omit cleaning hair or under fingernails if contaminated. Do not reuse clothing without laundering. Do not reuse contaminated leatherware.  
In case of eye contact, immediately irrigate with plenty of water for 15 minutes. Obtain medical attention without delay.

**EXPOSURE  
CONTROL METHODS**

Utilize a closed system process where feasible. Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure. Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands with soap and water. Prevent eye and skin contact. Wear the special protective equipment specified below for operations where eye or skin contact can occur. Prevent contamination of skin or clothing when removing protective equipment. Provide eyewash fountain and safety shower in close proximity to points of potential exposure. Where exposures are below the PEL, no respiratory protection is required. Where exposures exceed the PEL, use respirator approved by NIOSH or full protective suit with air supply appropriate for the material and level of exposure. See "GUIDE TO INDUSTRIAL RESPIRATORY PROTECTION"(NIOSH).  
Special protective equipment - To prevent skin contact wear skin protection, such as impervious gloves, apron, workpants, long sleeve workshirt, or disposable coveralls. To prevent eye contact wear eye protection such as chemical splash proof goggles or face shield.

**FIRE AND  
EXPLOSION  
HAZARD  
INFORMATION**

FLASH POINT: >200 F (>93.3 C)  
METHOD: Setaflash Closed Cup

FLAMMABLE LIMITS  
(% BY VOL): Not Available

AUTOIGNITION TEMP: Not Available

DECOMPOSITION TEMP: Not Available

FIRE FIGHTING: Use carbon dioxide or dry chemical to extinguish fires. Contact with water liberates toxic and flammable hydrogen sulfide gas. Wear self-contained, positive pressure breathing apparatus and full firefighting protective clothing. See Exposure Control Methods for special protective clothing. Use water to keep cool containers but avoid letting it contact this product. Do not flush to sewers. Sulfur oxides and/or toxic and flammable hydrogen sulfide may be formed under fire conditions.

**REACTIVITY DATA**

STABILITY: Stable  
CONDITIONS TO AVOID: Avoid contact with water, acids, and excessive heat (175 F, 79.4 C).

POLYMERIZATION: Will Not Occur  
CONDITIONS TO AVOID: None known

INCOMPATIBLE MATERIALS: Contact with water or water solutions liberates toxic and flammable hydrogen sulfide. Strong acids and/or oxidizing agents may react violently.

**AEROFLOAT® 25 Promoter****HAZARDOUS  
DECOMPOSITION  
PRODUCTS:**

Thermal decomposition or combustion may produce carbon monoxide, carbon dioxide, sulfur oxides and/or hydrogen sulfide.

**PHYSICAL  
PROPERTIES****APPEARANCE AND  
ODOR:**

Dark amber to black liquid with tarry cresole odor

**BOILING POINT:**

Not Available

**MELTING POINT:**

Not Available

**VAPOR PRESSURE:**

Negligible

**SPECIFIC GRAVITY:**

1.19

**VAPOR DENSITY:**

Not Available

**% VOLATILE (BY VOL):**

<1

**OCTANOL/H<sub>2</sub>O  
PARTITION COEF.:**

Not Available

**pH:**

Not Applicable

**SATURATION IN AIR  
(BY VOL):**

Not Available

**EVAPORATION RATE:**

Negligible

**SOLUBILITY IN WATER:**

Slight soluble

**SPILL OR LEAK  
PROCEDURES****STEPS TO BE TAKEN IN  
CASE MATERIAL IS  
RELEASED OR SPILLED:**

Where exposure level is not known, wear NIOSH approved, positive pressure, self-contained respirator. Where exposure level is known, wear NIOSH approved respirator suitable for level of exposure. In addition to the protective clothing/equipment in Exposure Control Methods, wear impervious boots. Cover spills with some inert absorbent material; sweep up and place in a waste disposal container. Flush area with water.

**WASTE DISPOSAL**

Disposal must be made in accordance with applicable governmental regulations.

**SPECIAL  
PRECAUTIONS****HANDLING AND  
STORAGE/OTHER:**

This product contains a dithioacid. Contact with water liberates toxic and flammable hydrogen sulfide gas. Do not mix with water or aqueous solutions of any other reagents since evolution of poisonous hydrogen sulfide gas could result. This precaution does not apply to addition to flotation pulps in amounts normally used in flotation. Store in a dry place out of sun and away from heat.

**D.O.T. SHIPPING  
INFORMATION****PROPER SHIPPING  
NAME:**

CORROSIVE LIQUID, N.O.S.

**HAZARD CLASS:**

CORROSIVE MATERIAL

**UN/NA:**

UN1760

**D.O.T. HAZARDOUS  
SUBSTANCES:**

(Reportable Quantity of Product)  
CRESOL (6,666 lbs-15%)

**D.O.T. LABEL REQUIRED:**

Corrosive

**AEROFLOAT® 25 Promoter**

MSDS NO. 0617-04

PAGE 4 OF 4

**TSCA  
INFORMATION**

This product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U.S.C.

**ENVIRONMENTAL  
INFORMATION**

The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.

COMPONENT	CAS. NO.	%	SARA TITLE III			RCRA	TSCA 12B
			TPQ (lbs.)	RQ (lbs.)	5313		
Cresylic acid (cresol)	001319-77-3	15	NONE	1000	YES	U052	NO

**PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA**

ACUTE (Y)	CHRONIC (N)	FIRE (N)	REACTIVE (Y)	PRESSURE (N)
-----------	-------------	----------	--------------	--------------

Marvin A. Friedman, Ph.D., Director of Toxicology and Product Safety

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**DRAFT**

PAGE 1 OF 3

**MATERIAL SAFETY DATA**MSDS NO. 0299-02  
DATE:**PRODUCT IDENTIFICATION**

PRODUCT NAME: **AERO® 412 Promoter, Aqueous**

SYNONYMS: None

CHEMICAL FAMILY: Dithiophosphate

MOLECULAR FORMULA:  $(C_5H_{11}O)_2P(S)_2Na$

MOLECULAR WGT.: 292

**WARNING****DANGER! CAUSES BURNS OF EYES AND SKIN****OSHA REGULATED COMPONENTS**

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
No Permissible Exposure Limits (PEL/TLV) have been established by OSHA or ACGIH.				

**NFPA HAZARD RATING**

Fire 1

Health 2 0 Reactivity

Special

**FIRE:** Material that must be preheated before ignition can occur.

**HEALTH:** Materials which on intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical treatment is given.

**REACTIVITY:** Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.

**HEALTH HAZARD INFORMATION****EFFECTS OF OVEREXPOSURE:**

Liquid may cause severe skin irritation and severe eye irritation. Repeated or prolonged dermal contact also may cause allergic skin reactions. Overexposure to hydrogen sulfide gas may cause severe eye or respiratory tract irritation, rapid development of coma and respiratory failure. Low levels of hydrogen sulfide may cause headache, dizziness, staggering gait, neurological damage gastritis. While hydrogen sulfide has a strong rotten-egg odor, some people are unable to smell the gas and hydrogen sulfide deadens the sense of smell.

**FIRST AID:**

In case of skin contact, remove contaminated clothing without delay. Wear impervious gloves. Cleanse skin thoroughly with soap and water. Do not omit cleaning hair or under fingernails if contaminated. Do not reuse clothing without laundering. Do not reuse contaminated leatherware.

In case of eye contact, immediately irrigate with plenty of water for 15 minutes. Obtain medical attention without delay.

**EXPOSURE CONTROL METHODS**

Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control

**EMERGENCY PHONE: 201/835-3100****AMERICAN CYANAMID COMPANY, 1 CYANAMID PLAZA, WAYNE, NEW JERSEY 07470**



65/23/1990 08:31 FROM AMER. CYANAMID CHEMICALS TO

88012953073 P.03

**AERO® 412 Promoter, Aqueous**

MSDS NO. 0299-02 PAGE 2 OF 3

exposure. Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands with soap and water. Avoid skin contact. Protective clothing such as impervious gloves, apron, workpants, long sleeve work shirt, or disposable coveralls are recommended to prevent skin contact. For operations where eye or face contact can occur, wear eye protection such as chemical splash proof goggles or face shield. Eyewash equipment and safety shower should be provided in areas of potential exposure. For operations where inhalation exposure can occur, a NIOSH approved respirator recommended by an industrial hygienist may be necessary. A full facepiece respirator also provides eye and face protection.

**FIRE AND  
EXPLOSION  
HAZARD  
INFORMATION**

FLASH POINT:	>200 F (>93.3 C)
METHOD:	Setaflash Closed Cup
FLAMMABLE LIMITS (% BY VOL):	Not Available
AUTOIGNITION TEMP:	Not Available
DECOMPOSITION TEMP:	Not Available
FIRE FIGHTING:	Use water spray, carbon dioxide or dry chemical to extinguish fires. Use water to keep containers cool. Wear self-contained, positive pressure breathing apparatus and full fire-fighting protective clothing. See Exposure Control Methods for special protective clothing.

**REACTIVITY DATA**

STABILITY:	Stable
CONDITIONS TO AVOID:	None known
POLYMERIZATION:	Will Not Occur
CONDITIONS TO AVOID:	None known
INCOMPATIBLE MATERIALS:	Product reacts with acids to liberate hydrogen sulfide.
HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition or combustion (of dried solids) may produce carbon monoxide, carbon dioxide, sulfur oxides and/or hydrogen sulfide.

**PHYSICAL  
PROPERTIES**

APPEARANCE AND ODOR:	Light straw to amber liquid; no odor
BOILING POINT:	217 F(103 C)
MELTING POINT:	48 F; 8.8 C(freezing point)
VAPOR PRESSURE:	Not Available
SPECIFIC GRAVITY:	1.156 @ 25 C
VAPOR DENSITY:	Not Available
% VOLATILE (BY VOL):	65 (water by weight)
OCTANOL/H <sub>2</sub> O PARTITION COEF.:	Not Available
pH:	11.0 minimum
SATURATION IN AIR (BY VOL):	Not Available
EVAPORATION RATE:	Not Available
SOLUBILITY IN WATER:	Complete

**AERO® 412 Promoter, Aqueous****SPILL OR LEAK  
PROCEDURES****STEPS TO BE TAKEN IN  
CASE MATERIAL IS  
RELEASED OR SPILLED:**

Where exposure level is not known, wear NIOSH approved, positive pressure, self-contained respirator. Where exposure level is known, wear NIOSH approved respirator suitable for level of exposure. In addition to the protective clothing/equipment in Exposure Control Methods, wear rain suit. Cover spills with some inert absorbent material; sweep up and place in a waste disposal container. Flush area with water.

**WASTE DISPOSAL**

Disposal must be made in accordance with applicable governmental regulations.

**SPECIAL  
PRECAUTIONS****HANDLING AND  
STORAGE/OTHER:**

This product should not be mixed with acids since evolution of toxic and explosive hydrogen sulfide gas could result. This precaution does not, of course, apply to addition of this reagent to flotation pulps in amounts customarily used in flotation.

**D.O.T. SHIPPING  
INFORMATION****PROPER SHIPPING  
NAME:**

ALKALINE LIQUID, N.O.S.

**HAZARD CLASS:**

CORROSIVE MATERIAL

**UN/NA:**

NA1719

**D.O.T. HAZARDOUS  
SUBSTANCES:**(Reportable Quantity of Product)  
NONE**D.O.T. LABEL REQUIRED:** Corrosive**TSCA  
INFORMATION**

This product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U.S.C.

**ENVIRONMENTAL  
INFORMATION**

The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.

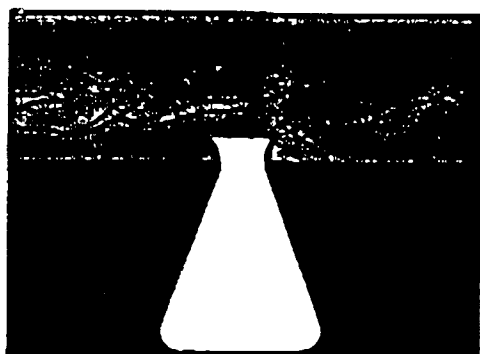
COMPONENT	CAS. NO.	%	SARA TITLE III			RCRA	TSCA 128
			TPQ (lbs.)	RQ (lbs.)	S313		
This product does not contain any components regulated under these sections of the EPA							

**PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA**

ACUTE (Y) CHRONIC (N) FIRE (N) REACTIVE (N) PRESSURE (N)

Marvin A. Friedman, Ph.D., Director of Toxicology and Product Safety

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# Aqueous AERO<sup>®</sup> 412 promoter

MC 10

AERO 412 promoter is an aqueous solution of a two component collector based on alkyl dithiophosphate, for use in the flotation of the sulfides of copper, lead, zinc and nickel for metallic copper and for the iron sulfides in acid circuit.

## ADVANTAGES

**Aqueous solution** — improved handling, mixing and feeding characteristics. Although generally fast acting, it is sometimes advantageous to add part or all of the collector to the grinding circuit. Unlike xanthates this product is stable in acid circuit.

## APPLICATION

AERO 412 promoter as sold can be fed directly, or can be diluted to any desired strength. For ease of metering it is usually diluted 5 to 10 times. This product has practically no frothing properties.

## TYPICAL PROPERTIES

Appearance	Variable colored green to amber liquid	
pH (as is)	13	
pH (as 10% solution)	12	
Specific Gravity	1.2 at 30°C (86°F)	
Freeze-thaw stability	Good	
Boiling Point	103°C (217°F)	
Freezing Point	Ppt Forms	None
	Reagent Pourable	9°C (48°F)
	Reagent Solidifies Below	9°C (48°F)
Viscosity (centipoise)	15 at 9°C (48°F)	
	7 at 30°C (86°F)	

## PRINCIPAL USES

Flotation of copper, silver, lead and activated zinc sulfides; as well as metallic copper in alkaline circuits; copper sulfides, metallic copper and iron sulfides in acid circuit, particularly suited in conjunction with amyl xanthate for the flotation of nickel sulfides, such as pentlandite, and nickelferous pyrrhotite, in acid and sodium carbonate circuits. Recommended for slow floating and tarnished sulfides. This product can be used alone or in conjunction with xanthates.

## TREATMENT LEVEL

Dosage rates are usually in the range 0.01—0.20 lb. promoter/ton (5 to 100 grams/metric ton). For maximum selectivity and effectiveness stage addition can be helpful.

**CYANAMID**

MINING CHEMICALS, AMERICAN CYANAMID COMPANY, WAYNE, NEW JERSEY 07470

## ENVIRONMENTAL PROPERTIES

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BOD <sub>6</sub> (gms of BOD/gm of Reagent)	less than .01
COD (gms of COD/gm of Reagent)	0.8

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## TOXICITY

Prolonged contact of the strong solution with the skin should be avoided. Where contact has been made, water in copious quantities should be used to cleanse. Alkali burns of the skin may result if protective gloves and goggles or face shields are not used during handling. In case of eye contact, wash eye in eye bath immediately for 15 minutes. If taken internally, vomiting should be induced, although the material is considered to be only mildly toxic.

## HANDLING

The aqueous AERO promoters are corrosive to a greater or lesser extent to most metals. It is recommended that the storage of either the **strong** or **diluted** solution of the product be in 316 stainless steel or in mild steel tanks equipped with a phenolic liner. Plastic or phenolic type pipe is suitable for transfer of the product in either the strong or diluted form.

## TECHNICAL SERVICE

Technical service and information for making the best use of this product are available through your Cyanamid representative.

## SHIPPING

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50/55 gallon non-returnable steel drums.  
Net 525 lbs., Gross 573 lbs., F.O.B. Warners, N.J.

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## IMPORTANT NOTICE

The information and statements herein are believed to be reliable but are not to be construed as a warranty or representation for which we assume legal responsibility. Users should undertake sufficient verification and testing to determine the suitability for their own particular purpose of any information or products referred to herein. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS MADE.

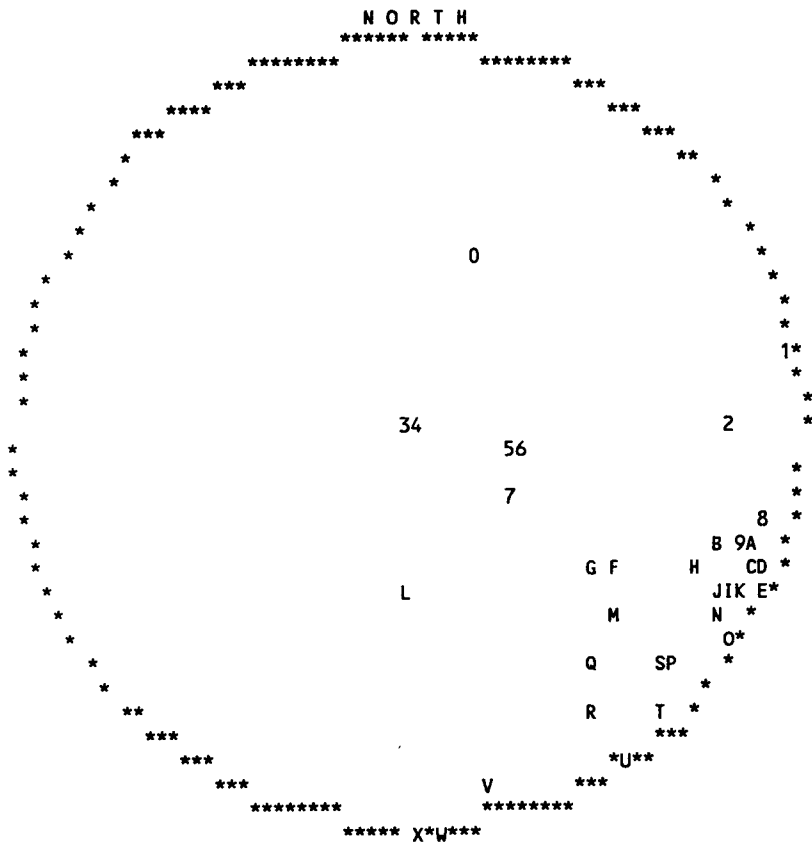
Nothing herein is to be taken as permission, inducement or recommendation to practice any patented invention without a license.

**Appendix K.**  
**Ground Water Utilization Printouts**

UTAH DIVISION OF WATER RIGHTS  
 WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, MAY 26, 1992, 1:37 PM  
 PLOT SHOWS LOCATION OF 99 POINTS OF DIVERSION

PLOT OF AN AREA WITH A RADIUS OF 21120 FEET FROM A POINT  
 N 2000 FEET, W 1300 FEET OF THE SE CORNER,  
 SECTION 34 TOWNSHIP 27S RANGE 11W SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 10000 FEET



UTAH DIVISION OF WATER RIGHTS  
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	AND/OR AC-FT	SOURCE DESCRIPTION DIAMETER	or WELL INFO DEPTH	YEAR LOG	NORTH	EAST	POINT OF DIVERSION DESCRIPTION CNR SEC	TWN	RNG B&M	U N	A P	T P	S E	U P	R E
0	71 3843	.0000	2.00	10	250	1941 N	N	1450 E	2250 SW 23 27S	11W SL	X	X					
		WATER USE(S): OTHER		Noranda Exploration Inc.		65 North Edison		Reno		PRIORITY DATE: 09/20/1989		NV 89502					
1	71 1444	.0000	.00	Underground Water Well			N	1365 E	160 S4 29 27S	10W SL	X	X					
		WATER USE(S): IRRIGATION STOCKWATERING		Sullivan Land & Livestock Co.				Milford		PRIORITY DATE: 09/00/1917		UT 84751					
2	71 1270	.0000	.00	Underground Water Well			N	10 W	240 E4 31 27S	10W SL	X	X					
		WATER USE(S): IRRIGATION DOMESTIC		Milford, City of				Milford		PRIORITY DATE: 06/21/1940		UT 84751					
3	71 2296	1.5000	.00	Underground Water Well			N	2254 W	1720 SE 34 27S	11W SL	X	X					
		WATER USE(S): OTHER		Toledo Mining Company		322 Newhouse Building		Salt Lake City		PRIORITY DATE: 02/21/1957		UT 84111					
4	71 1998	.7540	.00	15	593		N	2010 W	945 SE 34 27S	11W SL	X	X					
		WATER USE(S): MINING		Birch Ranch and Oil Company		427 West 5th Street		Los Angeles		PRIORITY DATE: 10/08/1947		CA					
5	71 3583	.0000	1.50	6	500		N	1480 W	1385 SE 35 27S	11W SL	X	X					
		WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING		Bradshaw, Neil		P.O. Box #182		Milford		PRIORITY DATE: 00/00/1931		UT 84751					
6	71 3785	.0000	1.00	6	301	1988 Y	N	1225 W	886 NE 2 28S	11W SL	X	X					
		WATER USE(S): IRRIGATION DOMESTIC		Smith, Paul M. & Trudy L.		P. O. Box 969		Milford		PRIORITY DATE: 00/00/1931		UT 84751					
7	71 459	.0000	87.31	14	200		S	1420 W	1080 NE 2 28S	11W SL	X	X					
		WATER USE(S): IRRIGATION		Sherwood, Jimmy M.		P. O. Box 592		Milford		PRIORITY DATE: 05/00/1921		UT 84751					
7	71 3644	.0000	1.00	6	500		S	1480 W	1385 NE 2 28S	11W SL	X	X					
		WATER USE(S): IRRIGATION DOMESTIC		Smith, Paul M. & Trudy L.		P. O. Box 969		Milford		PRIORITY DATE: 00/00/1931		UT 84751					
8	71 1421	.0000	.00	Underground Water Well			S	215 E	1410 W4 5 28S	10W SL	X	X					
		WATER USE(S): STOCKWATERING		Sullivan Land & Livestock Co.				Milford		PRIORITY DATE: 00/00/1917		UT 84751					
9	71 3686	.1500	.00	6	100 - 200		S	558 E	267 W4 5 28S	10W SL	X	X					
		WATER USE(S): OTHER		Quality Market Corporation		P.O. Box #699		Delta		PRIORITY DATE: 07/30/1984		UT 84624					
A	71 2180	.0000	.00	Underground Water Well			N	1370 E	970 SW 5 28S	10W SL	X	X					
		WATER USE(S): STOCKWATERING		Kirk, Nettie W.				Milford		PRIORITY DATE: 07/21/1958		UT 84751					
B	71 565	.5010	.00	Underground Water Well			S	1285 W	1160 E4 6 28S	10W SL	X	X					
		WATER USE(S): IRRIGATION OTHER		Board of Education		Beaver County Scholl District		Beaver		PRIORITY DATE: 00/00/1915		UT 84713					
B	71 498	1.1140	.00	12	439		S	1285 W	1160 E4 6 28S	10W SL	X	X					
		WATER USE(S): MUNICIPAL		Milford, City of				Milford		PRIORITY DATE: 00/00/1903		UT 84751					
B	71 500	1.0030	.00	12	439		S	1285 W	1160 E4 6 28S	10W SL	X	X					
		WATER USE(S): MUNICIPAL		Milford, City of				Milford		PRIORITY DATE: 00/00/1929		UT 84751					
B	71 499	1.0030	.00	12	439		S	1285 W	1160 E4 6 28S	10W SL	X	X					
		WATER USE(S): MUNICIPAL		Milford, City of				Milford		PRIORITY DATE: 00/00/1921		UT 84751					

UTAH DIVISION OF WATER RIGHTS  
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	CFS	QUANTITY AND/OR	AC-FT	SOURCE DESCRIPTION DIAMETER	or WELL INFO DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION						U A P T S U P R N P E E U G T E N P R R R W P D						
								NORTH	EAST	CNR	SEC	TWN	RNG	B&M	N	P	R	R	W	P
B	71 1226	.5880		.00	12	439		S	1285	W	1160	E4	6	28S	10W	SL		X		X
		WATER USE(S): MUNICIPAL Milford, City of													PRIORITY DATE: 10/14/1946 Milford UT 84751					
B	71 1227	1.7035		.00	12	439		S	1285	W	1160	E4	6	28S	10W	SL		X		X
		WATER USE(S): MUNICIPAL Milford, City of													PRIORITY DATE: 11/22/1946 Milford UT 84751					
B	71 497	.5815		.00	12	439		S	1285	W	1160	E4	6	28S	10W	SL		X		X
		WATER USE(S): MUNICIPAL Milford, City of													PRIORITY DATE: 04/07/1950 Milford UT 84751					
C	71 2826	.0150		.00	Underground Water Well			N	294	E	995	SW	5	28S	10W	SL		X		X
		WATER USE(S): STOCKWATERING Handley, Rozetta K.													PRIORITY DATE: 03/21/1960 Milford UT 84751					
					631 South 500 West															
C	71 3606	.0000		1.00	5	69		N	294	E	995	SW	5	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Handley, Rozetta K.													PRIORITY DATE: 10/01/1920 Milford UT 84751					
					631 South 500 West															
C	a12013	.0000		1.00	5	69		N	294	E	995	SW	5	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Handley, M. E.													PRIORITY DATE: 09/21/1981 Milford UT 84751					
					P.O. Box #321															
D	71 922	.0000		.00	16	146		N	115	E	1350	SW	5	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 06/00/1927 Milford UT 84751					
D	71 924	.0000		.00	16	146		N	115	E	1350	SW	5	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 06/00/1927 Milford UT 84720					
D	71 1441	.0000		.00	16	146		N	115	E	1350	SW	5	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 00/00/1926 Milford UT 84750					
D	71 923	.0000		.00	16	146		N	115	E	1350	SW	5	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 06/00/1927 Milford UT 84751					
D	71 925	.0000		.00	16	146		N	115	E	1350	SW	5	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 06/00/1927 Milford UT 84751					
					P. O. Box															
E	71 922	.0000		.00	16	145		S	1315	E	1380	NW	8	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 06/00/1927 Milford UT 84751					
E	71 924	.0000		.00	16	145		S	1315	E	1380	NW	8	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 06/00/1927 Milford UT 84720					
E	71 1441	.0000		.00	16	145		S	1315	E	1380	NW	8	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 00/00/1926 Milford UT 84750					
E	71 923	.0000		.00	16	145		S	1315	E	1380	NW	8	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 06/00/1927 Milford UT 84751					
E	71 925	.0000		.00	16	145		S	1315	E	1380	NW	8	28S	10W	SL		X		X
		WATER USE(S): IRRIGATION Sullivan, Gary E. (Family Trust)													PRIORITY DATE: 06/00/1927 Milford UT 84751					
					P. O. Box															



UTAH DIVISION OF WATER RIGHTS  
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY		SOURCE DESCRIPTION or WELL INFO		POINT OF DIVERSION DESCRIPTION							U A P T S U P R				
		CFS	AND/OR AC-FT	DIAMETER	DEPTH	YEAR LOG	NORTH	EAST	CNR	SEC	TWN	RNG B&M	N	P	E	E	G T E
F 71	3368	.0000	200.00	16	640		S	40 E	1320	N4 12	28S	11W SL			X		X
		WATER USE(S): IRRIGATION											PRIORITY DATE: 10/20/1948				
		Sullivan, Gary E. & Ned L.											Milford UT 84751				
F 71	1646	.0000	842.80	16	640		S	40 E	1320	N4 12	28S	11W SL			X		X
		WATER USE(S): IRRIGATION STOCKWATERING											PRIORITY DATE: 08/30/1948				
		Dalton, Stanley and Suzann A.		P. O. Box 13									Minersville UT 84752				
G 71	3368	.0000	200.00	16	420		S	50 E	70	N4 12	28S	11W SL			X		X
		WATER USE(S): IRRIGATION											PRIORITY DATE: 10/20/1948				
		Sullivan, Gary E. & Ned L.											Milford UT 84751				
G 71	1646	.0000	842.80	16	420		S	50 E	70	N4 12	28S	11W SL			X		X
		WATER USE(S): IRRIGATION STOCKWATERING											PRIORITY DATE: 08/30/1948				
		Dalton, Stanley and Suzann A.		P. O. Box 13									Minersville UT 84752				
H 71	1419	.0000	.00	Underground Water Well			S	110 W	2020	NE 7	28S	10W SL			X		X
		WATER USE(S): IRRIGATION DOMESTIC											PRIORITY DATE: 05/00/1912				
		Milford Industrial Foundation, Inc.											Milford UT 84751				
I 71	498	1.1140	.00	16	467		S	690 W	590	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 00/00/1903				
		Milford, City of											Milford UT 84751				
I 71	500	1.0030	.00	16	467		S	690 W	590	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 00/00/1929				
		Milford, City of											Milford UT 84751				
I 71	499	1.0030	.00	16	467		S	690 W	590	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 00/00/1921				
		Milford, City of											Milford UT 84751				
I 71	1226	.5880	.00	16	467		S	690 W	590	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 10/14/1946				
		Milford, City of											Milford UT 84751				
I 71	1227	1.7035	.00	16	467		S	690 W	590	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 11/22/1946				
		Milford, City of											Milford UT 84751				
I 71	497	.5815	.00	16	467		S	690 W	590	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 04/07/1950				
		Milford, City of											Milford UT 84751				
I 71	498	1.1140	.00	12	110		S	930 W	275	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 00/00/1903				
		Milford, City of											Milford UT 84751				
I 71	500	1.0030	.00	12	110		S	930 W	275	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 00/00/1929				
		Milford, City of											Milford UT 84751				
I 71	499	1.0030	.00	12	110		S	930 W	275	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 00/00/1921				
		Milford, City of											Milford UT 84751				
I 71	1226	.5880	.00	12	110		S	930 W	275	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 10/14/1946				
		Milford, City of											Milford UT 84751				
I 71	1227	1.7035	.00	12	110		S	930 W	275	NE 7	28S	10W SL			X		X
		WATER USE(S): MUNICIPAL											PRIORITY DATE: 11/22/1946				
		Milford, City of											Milford UT 84751				

UTAH DIVISION OF WATER RIGHTS  
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER DEPTH YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH EAST CNR SEC TWN RNG B&M	U A P T S U P R N P E E U G T E N P R R R W P D
I 71	497	.5815	.00	12 110	S 930 W 275 NE 7 28S 10W SL PRIORITY DATE: 04/07/1950 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
I 71	462	.0890	.00	Underground Water Well	S 1000 W 330 NE 7 28S 10W SL PRIORITY DATE: 05/00/1912 Milford UT 84751	X X
		WATER USE(S): DOMESTIC OTHER Jefferson Mercantile Company				
J 71	498	1.1140	.00	16 589	S 821 W 830 NE 7 28S 10W SL PRIORITY DATE: 00/00/1903 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	500	1.0030	.00	16 589	S 821 W 830 NE 7 28S 10W SL PRIORITY DATE: 00/00/1929 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	499	1.0030	.00	16 589	S 821 W 830 NE 7 28S 10W SL PRIORITY DATE: 00/00/1921 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	1226	.5880	.00	16 589	S 821 W 830 NE 7 28S 10W SL PRIORITY DATE: 10/14/1946 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	1227	1.7035	.00	16 589	S 821 W 830 NE 7 28S 10W SL PRIORITY DATE: 11/22/1946 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	497	.5815	.00	16 589	S 821 W 830 NE 7 28S 10W SL PRIORITY DATE: 04/07/1950 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	498	1.1140	.00	7 102	S 830 W 780 NE 7 28S 10W SL PRIORITY DATE: 00/00/1903 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	500	1.0030	.00	7 102	S 830 W 780 NE 7 28S 10W SL PRIORITY DATE: 00/00/1929 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	499	1.0030	.00	7 102	S 830 W 780 NE 7 28S 10W SL PRIORITY DATE: 00/00/1921 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	1226	.5880	.00	7 102	S 830 W 780 NE 7 28S 10W SL PRIORITY DATE: 10/14/1946 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	1227	1.7035	.00	7 102	S 830 W 780 NE 7 28S 10W SL PRIORITY DATE: 11/22/1946 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	497	.5815	.00	7 102	S 830 W 780 NE 7 28S 10W SL PRIORITY DATE: 04/07/1950 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	498	1.1140	.00	14 533	N 1250 W 1035 E4 7 28S 10W SL PRIORITY DATE: 00/00/1903 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				
J 71	500	1.0030	.00	14 533	N 1250 W 1035 E4 7 28S 10W SL PRIORITY DATE: 00/00/1929 Milford UT 84751	X X
		WATER USE(S): MUNICIPAL Milford, City of				

UTAH DIVISION OF WATER RIGHTS  
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	CFS	QUANTITY AND/OR	AC-FT	SOURCE DESCRIPTION DIAMETER	or WELL INFO DEPTH	POINT OF DIVERSION DESCRIPTION YEAR LOG	NORTH	EAST	CNR	SEC	TWN	RNG	B&M	U A P T S U P R N P E E U G T E N P R R R W P D			
J	71 499	1.0030		.00	14	533		N	1250	W	1035	E4 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 00/00/1921 Milford UT 84751				
J	71 1226	.5880		.00	14	533		N	1250	W	1035	E4 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 10/14/1946 Milford UT 84751				
J	71 1227	1.7035		.00	14	533		N	1250	W	1035	E4 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 11/22/1946 Milford UT 84751				
J	71 497	.5815		.00	14	533		N	1250	W	1035	E4 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 04/07/1950 Milford UT 84751				
K	71 120	.4460		.00	Underground Water Well			S	1315	E	5	NW 8 28S	10W SL		X	X		
		WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING OTHER Union Pacific Railroad Company 1416 Dodge Street												PRIORITY DATE: 00/00/1916 Omaha NE				
L	71 1575	.0000		.00	Underground Water Well			N	965	W	1380	E4 10 28S	11W SL		X	X		
		WATER USE(S): STOCKWATERING USA Bureau of Land Management 324 South State, Suite #301												PRIORITY DATE: 08/30/1948 Salt Lake City UT 84111-2303				
M	71 3368	.0000	200.00	16	660		S	2600	W	1330	NE 12 28S	11W SL		X	X			
		WATER USE(S): IRRIGATION Sullivan, Gary E. & Ned L.												PRIORITY DATE: 10/20/1948 Milford UT 84751				
M	71 1646	.0000	842.80	16	660		S	2600	W	1330	NE 12 28S	11W SL		X	X			
		WATER USE(S): IRRIGATION STOCKWATERING Dalton, Stanley and Suzann A. P. O. Box 13												PRIORITY DATE: 08/30/1948 Minersville UT 84752				
N	71 121	1.5600		.00	Underground Water Well			S	50	W	740	E4 7 28S	10W SL		X	X		
		WATER USE(S): IRRIGATION DOMESTIC OTHER Union Pacific Railroad Company 1416 Dodge Street												PRIORITY DATE: 04/09/1909 Omaha NE				
O	71 2177	.0000		.00	6	79		S	1520	W	200	E4 7 28S	10W SL		X	X		
		WATER USE(S): STOCKWATERING Davie, Victor V.												PRIORITY DATE: 11/22/1946 Milford UT 84751				
P	71 498	1.1140		.00	16	605		N	60	W	3390	SE 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 00/00/1903 Milford UT 84751				
P	71 500	1.0030		.00	16	605		N	60	W	3390	SE 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 00/00/1929 Milford UT 84751				
P	71 499	1.0030		.00	16	605		N	60	W	3390	SE 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 00/00/1921 Milford UT 84751				
P	71 1226	.5880		.00	16	605		N	60	W	3390	SE 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 10/14/1946 Milford UT 84751				
P	71 1227	1.7035		.00	16	605		N	60	W	3390	SE 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 11/22/1946 Milford UT 84751				
P	71 497	.5815		.00	16	605		N	60	W	3390	SE 7 28S	10W SL		X	X		
		WATER USE(S): MUNICIPAL Milford, City of												PRIORITY DATE: 04/07/1950 Milford UT 84751				

MAP CHAR	WATER RIGHT	CFS	QUANTITY AND/OR	AC-FT	SOURCE DESCRIPTION or WELL INFO			POINT OF DIVERSION DESCRIPTION							U A P T S U P R N P E E U G T E							
					DIAMETER	DEPTH	YEAR LOG	NORTH	EAST	CNR	SEC	TWN	RNG	B&M	N	P	R	R	R	W	P	D
Q	71 1648	.0000		.00	16	351		S	60	E	290	N4	13	28S	11W	SL		X	X			
			WATER USE(S): IRRIGATION Meyer, Russel Lee & Susan E. Meyer, Richard B. & Phyllis B.									PRIORITY DATE: 08/30/1948 Milford Milford						UT 84751 UT 84751				
Q	71 1647	.0000		.00	16	351		S	60	E	290	N4	13	28S	11W	SL		X	X			
			WATER USE(S): IRRIGATION Mayer, Russel Lee & Susan E. Mayer, Richard E. & Phyllis B.									PRIORITY DATE: 08/30/1948 Milford Milford						UT 84751 UT 84751				
R	71 1648	.0000		.00	16	370		S	1600	E	365	N4	13	28S	11W	SL		X	X			
			WATER USE(S): IRRIGATION Meyer, Russel Lee & Susan E. Meyer, Richard B. & Phyllis B.									PRIORITY DATE: 08/30/1948 Milford Milford						UT 84751 UT 84751				
R	71 1647	.0000		.00	Underground Water Wells				S	1600	E	515	S4	12	28S	11W	SL		X	X		
			WATER USE(S): IRRIGATION Mayer, Russel Lee & Susan E. Mayer, Richard E. & Phyllis B.									PRIORITY DATE: 08/30/1948 Milford Milford						UT 84751 UT 84751				
S	71 1936	.0000		186.08	Underground Water Well				S	160	E	1250	NW	18	28S	10W	SL		X	X		
			WATER USE(S): IRRIGATION OTHER Milford City									PRIORITY DATE: 07/27/1954 Milford						UT 84751				
T	71 1808	.0000		.00	Underground Water Well				S	60	E	1395	W4	18	28S	10W	SL		X	X		
			WATER USE(S): IRRIGATION STOCKWATERING Mayer, Leo E.									PRIORITY DATE: 04/16/1946 Milford						UT 84751				
U	71 103	.0000		.00	Underground Water Well				N	810	W	420	SE	13	28S	11W	SL		X	X		
			WATER USE(S): STOCKWATERING Western Farms Investment Company (c/o Sa									PRIORITY DATE: 00/00/1903 Milford						UT 84751				
V	71 917	.0000		.00	Unnamed Dry Wash				S	400	W	100	N4	23	28S	11W	SL		X	X		
			WATER USE(S): STOCKWATERING USA Bureau of Land Management									PRIORITY DATE: 06/29/1945 Salt Lake City						UT 84111-2303				
W	71 3591	.0000		17.52	14	290		S	70	E	40	W4	23	28S	11W	SL		X	X			
			WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING Tangren Family Trust (c/o Richard Tangre 3114 E. Charlston									PRIORITY DATE: 00/00/1925 Las Vegas						NV 87017				
W	71 1920	.0000		.00	Underground Water Well				S	80	E	50	W4	23	28S	11W	SL		X	X		
			WATER USE(S): DOMESTIC STOCKWATERING Tangren Family Trust, R. Tangren Trustee 3114 Charleston									PRIORITY DATE: 10/00/1926 Las Vegas						NV 89104				
W	71 1921	.0000		.00	Underground Water Well				S	80	E	50	W4	23	28S	11W	SL		X	X		
			WATER USE(S): DOMESTIC STOCKWATERING Tangren Family Trust, R. Tangren Trustee 3114 East Charleston									PRIORITY DATE: 10/00/1926 Las Vegas						NV 89104				
W	71 1919	.0000		.00	12	200		S	90	E	40	W4	23	28S	11W	SL		X	X			
			WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING Tangren Family Trust (R. Tangren trustee 3114 East Charleston									PRIORITY DATE: 10/00/1926 Las Vegas						NV 89104				
W	71 1807	.0000		.00	12	200		S	90	E	40	W4	23	28S	11W	SL		X	X			
			WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING Tangren Family Trust (R. Tangren, Trustee 3114 East Charleston									PRIORITY DATE: 00/00/1925 Las Vegas						NV 89104				
W	71 1408	.0000		.00	12	200		S	90	E	40	W4	23	28S	11W	SL		X	X			
			WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING Tagren Family Trust, (R. Tangren, Trustee									PRIORITY DATE: 10/00/1926						UT				
W	71 1919	.0000		.00	14	275		S	150	E	60	W4	23	28S	11W	SL		X	X			
			WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING Tangren Family Trust (R. Tangren trustee 3114 East Charleston									PRIORITY DATE: 10/00/										

UTAH DIVISION OF WATER RIGHTS  
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER DEPTH YEAR LOG	POINT OF DIVERSION DESCRIPTION				U A P T S U P R								
					NORTH	EAST	CNR	SEC	TWN	RNG	B&M	N	P	R	R	W	P
W	71 1807	.0000	.00	14 275	S	150	E	60	W4	23	28S	11W	SL		X		X
WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING					PRIORITY DATE: 00/00/1925												
Tangren Family Trust (R. Tangren, Trustee 3114 East Charleston					Las Vegas				NV 89104								
W	71 1408	.0000	.00	14 275	S	150	E	60	W4	23	28S	11W	SL		X		X
WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING					PRIORITY DATE: 10/00/1926												
Tagren Family Trust, (R. Tangren, Trustee					UT												
X	71 1966	.0000	.00	Underground Water Well	S	330	W	1030	E4	22	28S	11W	SL		X		X
WATER USE(S): DOMESTIC STOCKWATERING					PRIORITY DATE: 00/00/1926												
Tebbs, D. Ray					Panguitch				UT 84759								
Rasmussen, Roger					Fillmore				UT 84631								
X	71 170	.0000	.00	Underground Water Well	S	330	W	1030	E4	22	28S	11W	SL		X		X
WATER USE(S): DOMESTIC STOCKWATERING					PRIORITY DATE: 00/00/1926												
Tangren Family Trust (R. Tangren Trustee 3114 East Charleston					Las Vegas				NV 89104								

[illegible]

UTAH DIVISION OF WATER RIGHTS  
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

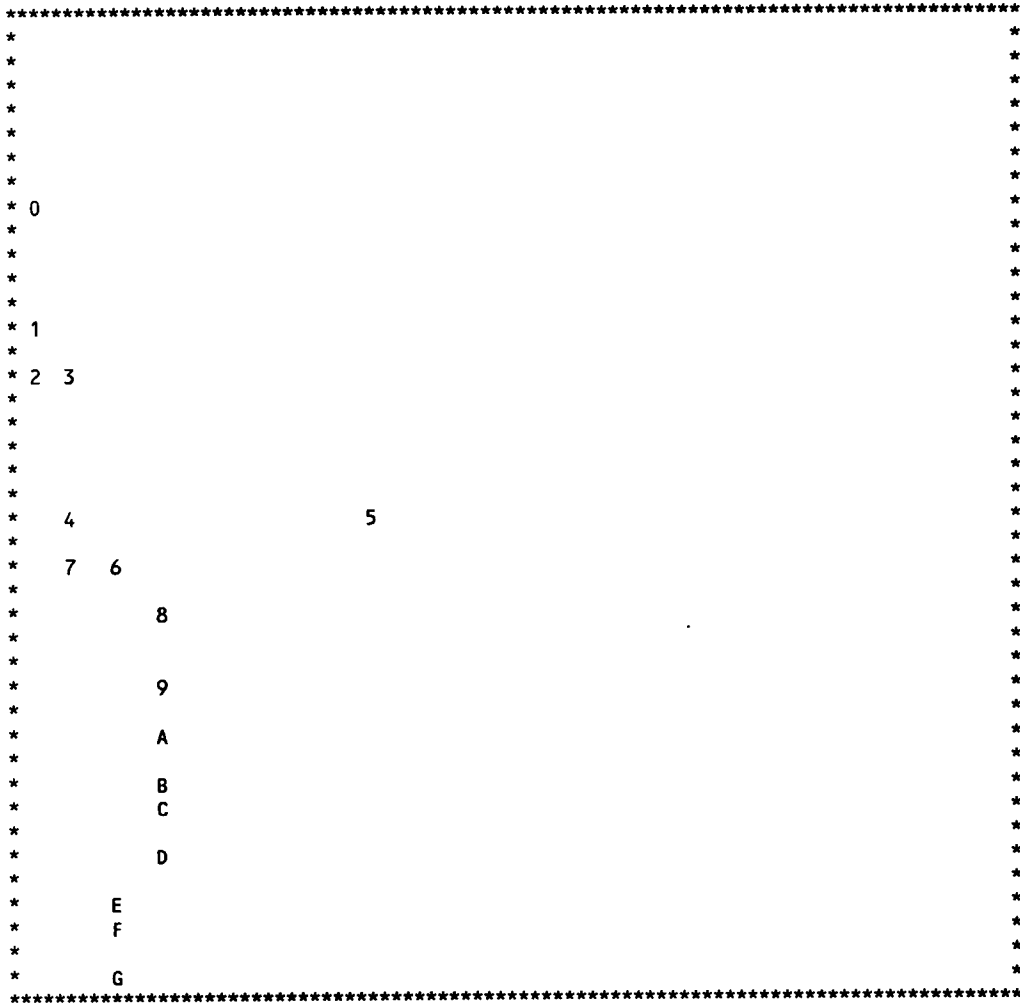
MAP CHAR	WATER RIGHT	CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO				POINT OF DIVERSION DESCRIPTION				U A P T S U P R							
				DIAMETER	DEPTH	YEAR LOG	NORTH	EAST	CNR	SEC	TWN	RNG	B&M	N	P	R	R	R	W P D
0	71 2668	.0000	.00	Beaver River													X	X	X
				WATER USE(S): STOCKWATERING					PRIORITY DATE: 00/00/1860										
				Seven Springs Ranch, Inc.				P. O. Box 426	St. Johns								AZ	85936	
				The Plateau Partnership				P. O. Box 426	St. Johns								AZ	85936	
0	71 2668	.0000	.00	Beaver River													X	X	X
				WATER USE(S): STOCKWATERING					PRIORITY DATE: 00/00/1860										
				Seven Springs Ranch, Inc.				P. O. Box 426	St. Johns								AZ	85936	
				The Plateau Partnership				P. O. Box 426	St. Johns								AZ	85936	
1	71 2667	.0000	.00	Beaver River													X	X	X
				WATER USE(S): STOCKWATERING					PRIORITY DATE: 00/00/1860										
				Hatch, William C. & Hatch, Garda					Scipio								UT	84656	
1	71 2666	.0000	.00	Beaver River													X	X	X
				WATER USE(S): STOCKWATERING					PRIORITY DATE: 00/00/1860										
				Hatch, Frank & Hatch, Lottie					Scipio								UT	84656	
2	71 2667	.0000	.00	Beaver River													X	X	X
				WATER USE(S): STOCKWATERING					PRIORITY DATE: 00/00/1860										
				Hatch, William C. & Hatch, Garda					Scipio								UT	84656	
2	71 2666	.0000	.00	Beaver River													X	X	X
				WATER USE(S): STOCKWATERING					PRIORITY DATE: 00/00/1860										
				Hatch, Frank & Hatch, Lottie					Scipio								UT	84656	
2	71 2665	.0000	.00	Beaver River													X	X	X
				WATER USE(S): STOCKWATERING					PRIORITY DATE: 00/00/1860										
				Seven Springs Ranch, Inc.				P. O. Box 426	St. Johns								AZ	85936	
				The Plateau Partnership				P. O. Box 426	St. Johns								AZ	85936	
3	71 2664	.0000	.00	Beaver River													X	X	X
				WATER USE(S): STOCKWATERING					PRIORITY DATE: 00/00/1860										
				PEARSON, RALPH				P O BOX 18	MINERSVILLE								UT	84752	
4	71 2664	.0000	.00	Beaver River													X	X	X
				WATER USE(S): STOCKWATERING					PRIORITY DATE: 00/00/1860										
				PEARSON, RALPH				P O BOX 18	MINERSVILLE								UT	84752	

UTAH DIVISION OF WATER RIGHTS  
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, MAY 26, 1992, 1:33 PM  
PLOT SHOWS LOCATION OF 23 POINTS OF DIVERSION

PLOT OF TOWNSHIP 25S RANGE 10W SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 6000 FEET

N O R T H





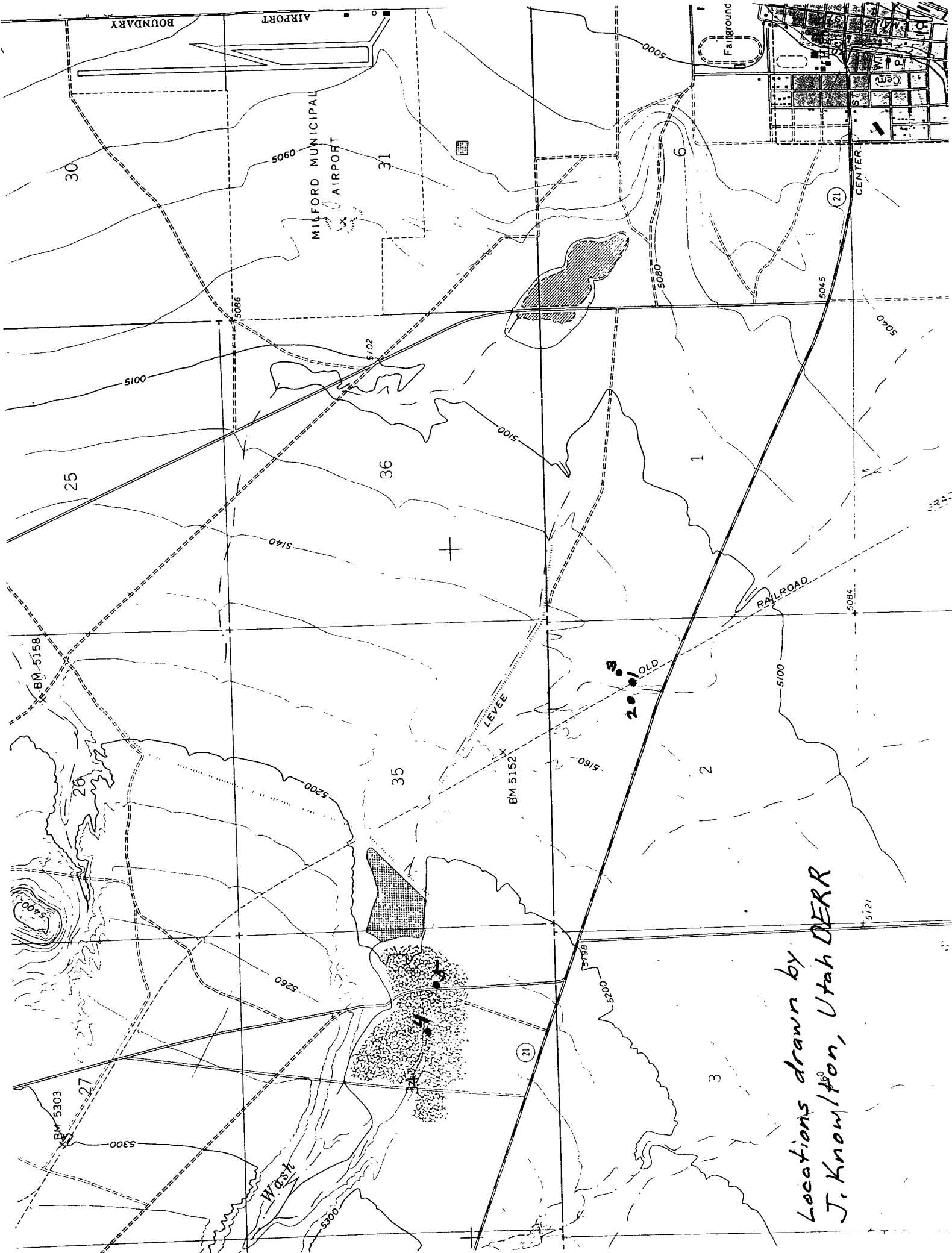
UTAH DIVISION OF WATER RIGHTS  
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	CFS	QUANTITY AND/OR	AC-FT	SOURCE DESCRIPTION or WELL INFO			POINT OF DIVERSION DESCRIPTION					U A P T S U P R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
					DIAMETER	DEPTH	YEAR LOG	NORTH	EAST	CNR	SEC	TWN	RNG	B&M	N	P	E	E	U	G	T																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0	71 2613	.0000		.00	Beaver River																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

UTAH DIVISION OF WATER RIGHTS  
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	CFS	QUANTITY		SOURCE DESCRIPTION or WELL INFO	POINT OF DIVERSION DESCRIPTION								U A P T S U P R							
			AND/OR	AC-FT		DIAMETER	DEPTH	YEAR LOG	NORTH	EAST	CNR	SEC	TWN	RNG B&M	N	P	E	E	U	G	T
7	71 2609	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING											PRIORITY DATE: 00/00/1860								
		USA Bureau of Land Management											Salt Lake City				UT	84111-2303			
8	71 2681	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		Daum, W. H. (and Staff)											Los Angeles				CA				
9	71 2681	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		Daum, W. H. (and Staff)											Los Angeles				CA				
A	71 2680	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		USA Bureau of Land Management											Salt Lake City				UT	84111-2303			
B	71 2680	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		USA Bureau of Land Management											Salt Lake City				UT	84111-2303			
C	71 2679	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		Daum, W. H. (and Staff)											Los Angeles				CA				
C	71 2679	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		Daum, W. H. (and Staff)											Los Angeles				CA				
D	71 2678	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		USA Bureau of Land Management											Salt Lake City				UT	84111-2303			
E	71 2678	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		USA Bureau of Land Management											Salt Lake City				UT	84111-2303			
F	71 2677	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		Daum, W. H. (and Staff)											Los Angeles				CA				
F	71 2677	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		Daum, W. H. (and Staff)											Los Angeles				CA				
G	71 2676	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		USA Bureau of Land Management											Salt Lake City				UT	84111-2303			
G	71 2676	.0000		.00	Beaver River													X	X	X	
		WATER USE(S): STOCKWATERING												PRIORITY DATE: 00/00/1860							
		USA Bureau of Land Management											Salt Lake City				UT	84111-2303			

**Appendix L.**  
**Utah Division of Water Rights,**  
**Selected File Information**



Locations drawn by  
J. Knowlton, Utah DERR

# 1.

Mr Johnson  
my well is drilled 580' Deep  
with an 8" casing I am down  
220' with my pump, and my water  
is at about 151'  
I have a Test From the college  
I will find and send it to  
you if you will leave me  
your Address

Thank you

Norman Thompson

Removed from  
Mr. Thompson's door

on 6/2/92 JHK

change to existing well #1  
from Sec. 29

IN THE FIFTH JUDICIAL DISTRICT COURT, IN AND FOR THE  
COUNTY OF IRON STATE OF UTAH

IN THE MATTER OF THE GENERAL DETERMINATION  
OF RIGHTS TO THE USE OF ALL THE WATER, BOTH  
SURFACE AND UNDERGROUND, WITHIN THE DRAINAGE  
AREA OF THE BEAVER RIVER-ESCALANTE VALLEY AND  
ALL TRIBUTARIES IN MILLARD, BEAVER, IRON  
WASHINGTON, KANE AND GARFIELD COUNTIES IN UTAH.

STATEMENT OF WATER  
USER'S CLAIM  
CODE NO. SERIAL NO.  
71. 459  
MAP NO. 22b

NOTE: This blank is sent to you in accordance with Utah Law. The information called for herein will be used in connection with the adjudication of water rights on the above mentioned drainage area. All questions applicable to your claim must be answered fully, and one copy of this form must be filed with the Clerk of the District Court at

Parowan, Utah, within sixty (60) days from date of service of the attached Notice. A copy shall be filed with the State Engineer, State Capitol, Salt Lake City. Failure to file the attached Statement of the Water User's Claim with the Clerk of the District Court within the time stated will forever bar and estop you from asserting any right to the use of water from said drainage area.

1. Name of Claimant Jimmy M. Sherwood  
P. O. Box 592 Interest Claimed full
2. Address Milford, Utah 84751
3. Name of particular ~~spring, spring, creek, stream, well, water, water~~ from which water is diverted is Underground Water Well in Beaver County.
4. Priority date claimed May, 1921 Date when water was first used May, 1921  
Date when work on diverting system was first begun May, 1921 Date when diverting system was completed May, 1921  
Nature of work 14 inch well, 200 ft. deep
5. Class of Right (Indicate by X):  
(a) XX Right to surface water initiated by beneficial use before 1903 Claim No. 12129, pgs. 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000
6. Nature (Indicate by X), Amount, and Annual Period of Use (by month & day):  
(a) XX Irrigation Sec. 187, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000
7. Direct Flow Appropriation (must be described with reference to U. S. Government Survey Corner)  
(a) Point of diversion from ~~spring, spring area, stream, well, water, water~~  
S. 1420 ft. and W. 1080 ft. from the NE Cor. Sec. 2, T28S, R11W, SLB&M.  
(b) Description of spring area  
(c) Point of redirection or point of return to natural channel  
(d) If flow is intermittently diverted, list by number or description, all rights involved
8. Where water is used for irrigation purposes:  
(a) Area irrigated in legal subdivisions of land by 40-acre tract. (All sources of water for same land or lands must be described in each instance by name or claim number). W. U. C. 459, 218, 1853 on;  
39.00 acs. NE 1/4, 40.00 acs. NW 1/4, Sec. 2, T28S, R11W, SLB&M, or a  
total of 79.0 acres.  
Water User's Claim 459 is limited to the irrigation requirements of 21.8275 acres.  
Water User's Claims 459, 218 and 1853 are limited to the irrigation requirements  
of 71.6275 acres.  
Diversions any, each, or all claims. Total yearly diversion under all claims  
mentioned 286.51 acre-feet.  
(b) Do you get water under a ditch owned by several users. If so, give names of all users and divisions of interest
9. Where water is used for Stockwatering:  
(a) Number of each kind of stock watered  
(b) All sources of water for same stock. (Describe by name or claim number)
10. Where water is used for Domestic:  
(a) Number of families or their equivalent All sources of water for same use.  
(Describe by name or claim number)

11. Where water is used for Municipal Purposes:

(a) Name of city or town supplied ..... Population .....  
Number of families ..... Quantity of water .....

12. Where water is used for a purpose not above enumerated:

(a) Nature of Use ..... Extent of Use .....

13. Appropriation for Storage Purposes:

(a) Name of reservoir .....

(b) Location of reservoir by legal subdivisions described by 40-acre tracts .....

(c) Maximum capacity of reservoir in acre feet ..... : Year construction commenced .....  
Completed ..... : Water first used ..... Is reservoir located on or off stream .....

(d) Period of Storage from ..... to ..... (both dates incl.). Period of use from .....  
to ..... (both dates incl.). Maximum area in acres inundated .. Max. depth in feet. ....

Average depth in feet..... Is reservoir drained each year..... Maximum number of fillings per  
year..... Is reservoir used for equalizing purposes..... If feeder canal is used, give maximum  
carrying capacity in sec. ft. ....

14. Diverting Works:

(a) Surface water diverting dam: Material composed of .....  
Max. length..... Max. height.....Max. width at bottom..... Max. width  
at top.....

(b) Underground water diverting works: Is well flowing or pump..... Depth of well.....  
Diameter of well..... Length of drain..... Width of drain ..... Depth of drain.....  
Diameter of drain..... Length of tunnel ..... Width of tunnel..... Height of tunnel.....  
Type of pump..... Capacity of pump.....

(c) Surface and underground water conveying works: Length of ditch to first place of use..... Width of  
ditch at top ..... Width of ditch at bottom..... Depth of water ..... Grade of  
ditch per 1000 ft. .... Material through which ditch passes..... Maximum length of  
pipe line to first place of use ..... Diameter of pipe line ..... Grade of pipe line per  
1000 feet .....

15. The undersigned hereby enters his appearance and waives service of summons or other process.

STATE OF UTAH

COUNTY OF Beaver  
Jimmy M. Sherwood

SS. (To be used if claimant is an individual)

being first duly sworn, upon oath deposes and says that he is the claimant  
whose name appears hereon, that he has read the foregoing statement of his claim and knows the contents thereof, that  
he has signed the same, and that the answers set forth therein are true to his best knowledge and belief.

Jimmy M. Sherwood  
Signature of Claimant

Subscribed and sworn to before me this 15th day of February 19 80

John W. Evans  
NOTARY PUBLIC

STATE OF UTAH

COUNTY OF .....

SS. (To be used if claimant is a corporation or an estate)

being first duly sworn, upon oath deposes and says that he is the .....  
of the above claimant, that he makes this certification on behalf of said  
claimant, that he has read the foregoing statement of claim and knows the contents thereof, and that he has signed the name  
of said claimant to said statement, that the answers set forth therein are true to his best knowledge and belief.

Subscribed and sworn to before me this ..... day of ..... 19 .....

NOTARY PUBLIC

Examined \_\_\_\_\_  
 Recorded: B. C. \_\_\_\_\_ T. B. \_\_\_\_\_  
 Inspection Sheet \_\_\_\_\_  
 Copied \_\_\_\_\_

# REPORT OF WELL DRILLER

## STATE OF UTAH

Application No. A-11687  
 Claim No. (21-3583)  
 Coordinate No. A-10020-2

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

## (1) WELL OWNER:

Name Bill Bradshaw  
 Address Wilford, Utah

## (2) LOCATION OF WELL:

County Beaver Ground Water Basin \_\_\_\_\_  
 S. 1392H T. 4W R. 39E NE  
 Section 2215 feet West 1660 feet from SE Corner

of Section 2 T 28 R 40 NE (strike out words not needed)  
 S. R. W. NW

## (3) NATURE OF WORK (check):

New Well ☒  
 Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐  
 If abandonment, describe material and procedure: \_\_\_\_\_

## (4) NATURE OF USE (check):

Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐  
 Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

## (5) TYPE OF CONSTRUCTION (check):

Rotary ☒ Dug ☐ Jetted ☐  
 Cable ☐ Driven ☐ Bored ☐

## (6) CASING SCHEDULE:

Threaded ☐ Welded ☒  
 6" Diam. from 240 feet to 500 feet Gage 48  
 " Diam. from \_\_\_\_\_ feet to \_\_\_\_\_ feet Gage \_\_\_\_\_  
 " Diam. from \_\_\_\_\_ feet to \_\_\_\_\_ feet Gage \_\_\_\_\_

New ☐ Reject ☐ Used ☐

## (7) PERFORATIONS:

Perforated? Yes ☒ No ☐  
 Type of perforator used Slotted  
 Size of perforations 1/8 inches by 4 inches  
 perforations from 250 feet to 500 feet  
 perforations from \_\_\_\_\_ feet to \_\_\_\_\_ feet  
 perforations from \_\_\_\_\_ feet to \_\_\_\_\_ feet  
 perforations from \_\_\_\_\_ feet to \_\_\_\_\_ feet

## (8) SCREENS:

Well screen installed? Yes ☐ No ☐  
 Manufacturer's Name \_\_\_\_\_  
 Type \_\_\_\_\_ Model No. \_\_\_\_\_  
 Diam. Slot size \_\_\_\_\_ Set from \_\_\_\_\_ ft. to \_\_\_\_\_  
 Diam. Slot size \_\_\_\_\_ Set from \_\_\_\_\_ ft. to \_\_\_\_\_

## (9) CONSTRUCTION:

Was well gravel packed? Yes ☒ No ☐ Size of gravel 1/4"  
 Gravel placed from 240 feet to 500 feet  
 Was a surface seal provided? Yes ☒ No ☐  
 To what depth? 240 feet  
 Material used in seal: Cement  
 Did any strata contain unusable water? Yes ☐ No ☒  
 Type of water: \_\_\_\_\_ Depth of strata: \_\_\_\_\_  
 Method of sealing strata off: \_\_\_\_\_

## (10) WATER LEVELS:

Static level \_\_\_\_\_ feet below land surface Date \_\_\_\_\_  
 Artesian pressure \_\_\_\_\_ feet above land surface Date \_\_\_\_\_

## (11) FLOWING WELL:

Controlled by (check) Valve ☐  
 Plug ☐ No Control ☐  
 Does well leak around casing? Yes ☐ No ☐

## (12) WELL TESTS:

Drawdown is the distance in feet the water level is lowered below static level.

Was a pump test made? Yes ☐ No ☒ If so, by whom? \_\_\_\_\_

Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ feet drawdown after \_\_\_\_\_ hours

" " " " " "

" " " " " "

Boiler test \_\_\_\_\_ gal./min. with \_\_\_\_\_ feet drawdown after \_\_\_\_\_ hours

Arterion flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_

Temperature of water \_\_\_\_\_ Was a chemical analysis made? No ☐ Yes ☐

## (13) WELL LOG:

Diameter of well 6" inches

Depth drilled 510 feet. Depth of completed well 510 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH		MATERIAL								REMARKS
From	To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	
0	8									Tap Soil
8	123	X			X					
103	133	X		X						
133	300	X		X	X					
300	500								X	Composite of decomposed blue granite.
500	510									

Work started 10-12 1981 Completed 10-20 1981

## (14) PUMP:

Manufacturer's Name \_\_\_\_\_  
 Type: \_\_\_\_\_ H. P. \_\_\_\_\_  
 Depth to pump or bowles \_\_\_\_\_ feet

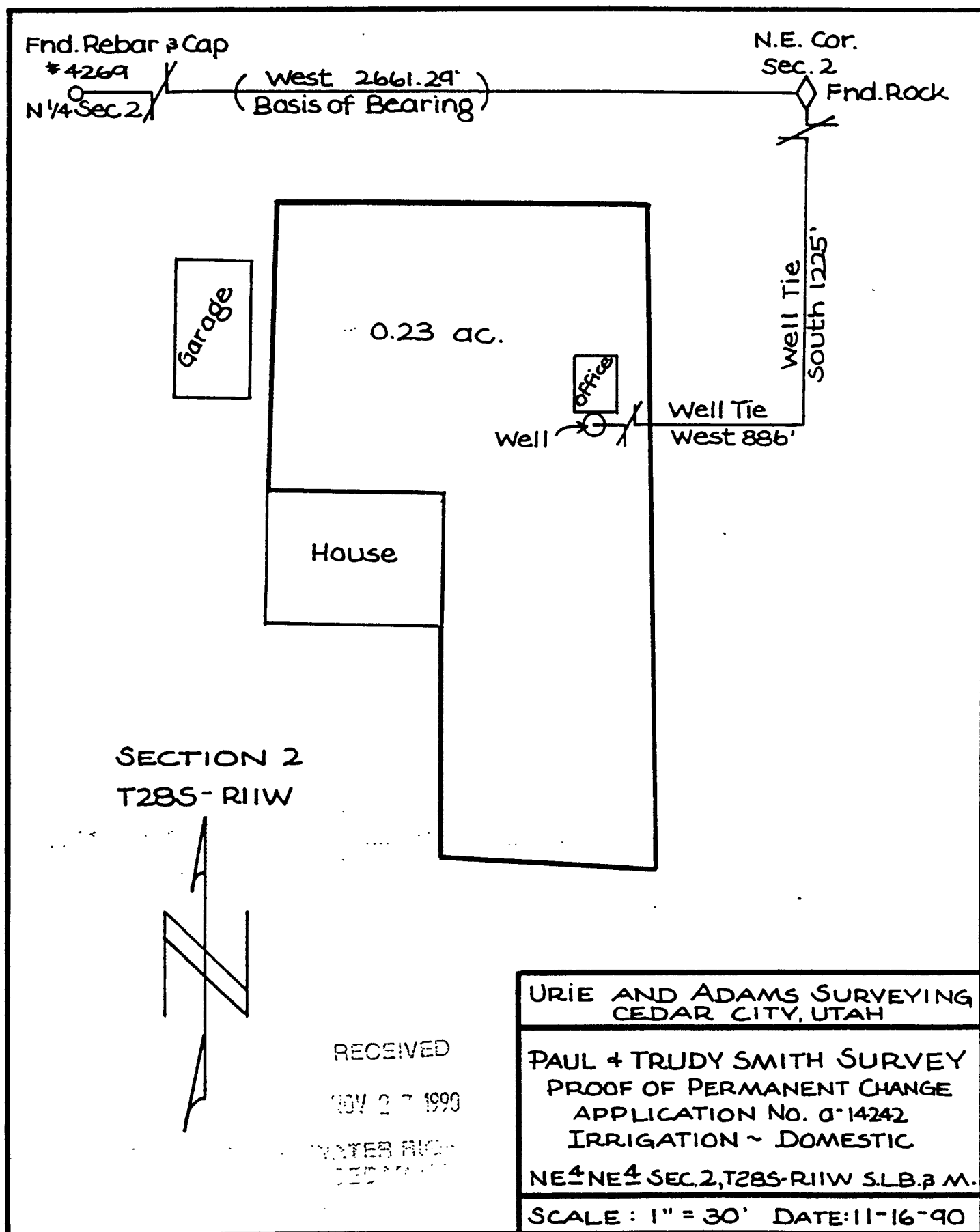
## Well Driller's Statement:

This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Bill Bradshaw (Type or print)  
 Address Wilford, Utah 84213  
 (Signed) Bill Bradshaw (well Driller)

License No. 126 Date 10-20 1981





Examined \_\_\_\_\_  
 Recorded: H. C. \_\_\_\_\_ T. D. \_\_\_\_\_  
 Inspection Sheet \_\_\_\_\_  
 Copied \_\_\_\_\_

# REPORT OF WELL DRILLER

STATE OF UTAH 1988

Application No. 71-3785 (914242)  
 Claim No. \_\_\_\_\_  
 Coordinate No. \_\_\_\_\_

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

## (1) WELL OWNER:

Name Paul Smith  
 Address Milford, UT 84751

## (2) LOCATION OF WELL:

County Bever Ground Water Basin \_\_\_\_\_  
 (Leave blank)  
 North 1225 East 800  
 South 1170 West 859 feet from NE Corner  
 of Section 2 T. 28 N. R. 11 SE 1/4 (strike  
 out words not needed)

## (3) NATURE OF WORK (check):

New Well ☒ Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐  
 If abandonment, describe material and procedure: \_\_\_\_\_

## (4) NATURE OF USE (check):

Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐  
 Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

## (5) TYPE OF CONSTRUCTION (check):

Rotary ☒ Dug ☐ Jetted ☐  
 Cable ☐ Driven ☐ Hored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☒

6 Diam. from 2.24 feet to 6 feet Gage 158

\_\_\_\_\_ Diam. from \_\_\_\_\_ feet to \_\_\_\_\_ feet Gage \_\_\_\_\_

\_\_\_\_\_ Diam. from \_\_\_\_\_ feet to \_\_\_\_\_ feet Gage \_\_\_\_\_

New ☒ Relect ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☐

Type of perforator used Milled

Size of perforations 1/8 inches by 3 inches

1250 perforations from 304 feet to 224 feet

\_\_\_\_\_ perforations from \_\_\_\_\_ feet to \_\_\_\_\_ feet

\_\_\_\_\_ perforations from \_\_\_\_\_ feet to \_\_\_\_\_ feet

\_\_\_\_\_ perforations from \_\_\_\_\_ feet to \_\_\_\_\_ feet

\_\_\_\_\_ perforations from \_\_\_\_\_ feet to \_\_\_\_\_ feet

(8) SCREENS: Well screen installed? Yes ☐ No ☒

Manufacturer's Name \_\_\_\_\_

Type \_\_\_\_\_ Model No. \_\_\_\_\_

Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ Set from \_\_\_\_\_ ft. to \_\_\_\_\_

Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ Set from \_\_\_\_\_ ft. to \_\_\_\_\_

## (9) CONSTRUCTION:

Was well gravel packed? Yes ☒ No ☐ Size of gravel 3/8

Gravel placed from 304 feet to 20 feet

Was a surface seal provided? Yes ☒ No ☐

To what depth? 20 feet

Material used in seal Ben tonite

Did any strata contain unusable water? Yes ☐ No ☒

Type of water: \_\_\_\_\_ Depth of strata \_\_\_\_\_

Method of sealing strata off: \_\_\_\_\_

Was surface casing used? Yes ☐ No ☒

Was it cemented in place? Yes ☐ No ☐

## (10) WATER LEVELS:

Static level \_\_\_\_\_ feet below land surface Date \_\_\_\_\_

Auxiliary pressure \_\_\_\_\_ feet above land surface Date \_\_\_\_\_

LOG RECEIVED: \_\_\_\_\_

## (11) FLOWING WELL:

Flowing by (check) Valve ☐

Cap ☐ Plug ☐ No Control ☐

Does well leak around casing? Yes ☐ No ☐

\_\_\_\_\_ No ☐

AUG 11 1988

WATER RIGHTS  
 CEDAR CITY

USE OTHER SIDE FOR ADDITIONAL REMARKS

## (12) WELL TESTS:

Drawdown is the distance in feet the water level is lowered below static level.

Was a pump test made? Yes ☐ No ☐ If so, by whom? \_\_\_\_\_

Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ feet drawdown after \_\_\_\_\_ hours

\_\_\_\_\_ " " " " " "

\_\_\_\_\_ " " " " " "

Ball test \_\_\_\_\_ gal./min. with \_\_\_\_\_ feet drawdown after \_\_\_\_\_ hours

Asterian flow \_\_\_\_\_ s.p.m. Date \_\_\_\_\_

Temperature of water \_\_\_\_\_ Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 6 inches

Depth drilled 304 feet. Depth of completed well 304 feet

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to character of water and the color, odor, taste, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH	Feet	MATERIAL										REMARKS
		Clay	Silt	Sand	Gravel	Cobbles	Boulders	Shales	Concretions	Bedrock	Other	
0	2	X										Top Soil
2	16	X										
16	54	X										
54	82	X										
82	119	X										
119	304	X										

Work started 7-13-88 at \_\_\_\_\_ Completed 7-18-88 at \_\_\_\_\_

## (14) PUMP:

Manufacturer's Name \_\_\_\_\_

Type \_\_\_\_\_ H. P. \_\_\_\_\_

Depth to pump or bowler \_\_\_\_\_ feet

## Well Driller's Statement:

This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name G. Z. McElroy & Sons Well Drilling, Inc. (Type or print)

Address 4514 N 680 E, Cedar City UT 84220

(Signed) G. Z. McElroy (Well Driller)

Licenses No. 514 Date 7-28-88, 1988

MICROFILMED

A-19178  
Application No. 25084 (71-4998)  
Claim No. \_\_\_\_\_  
Coordinate No. (C-28-11) 34 d 62

Well Driller's Statement:

This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

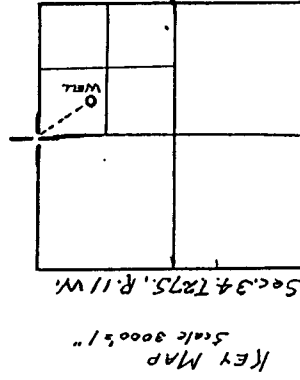
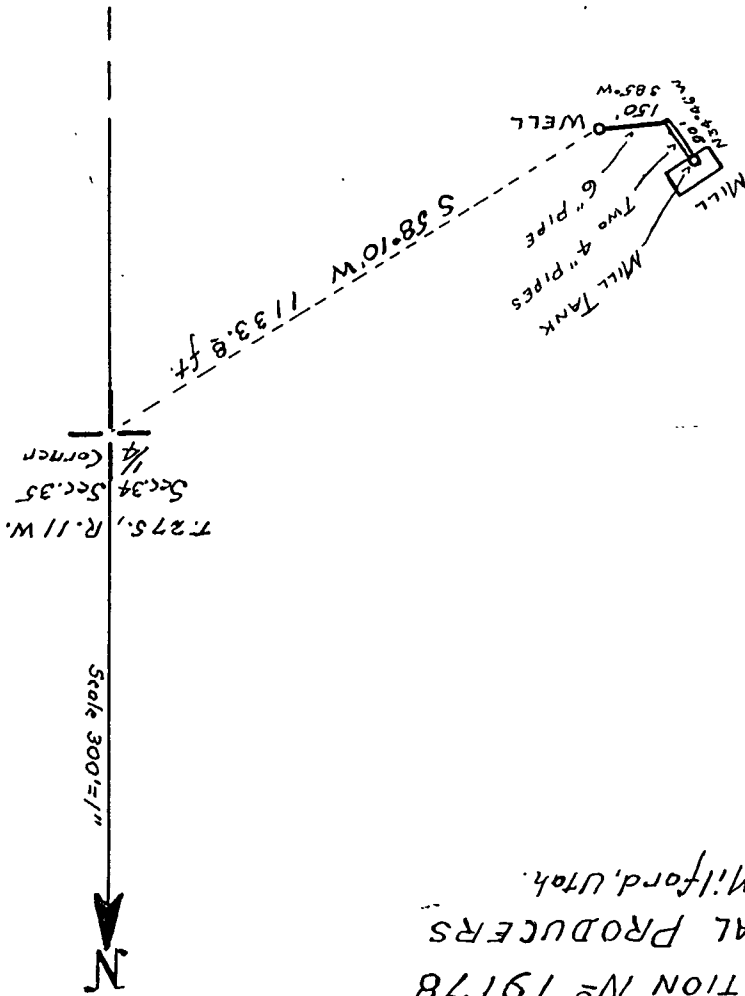
Name American Mining Company  
(Person, firm, or corporation) (Type or print)

Address Milford, Utah

(Signed) J. N. Huskey  
(Well Driller)

License No. 117 Date 19

Application No 19178  
METAL PRODUCERS  
Milford, Utah.



#5

Listed on well record.....  
 Listed by counties.....  
 Covered by high 6-1-88  
 Examined & ordered high 6-1-88  
 Examined for filing.....  
 Final Copy checked high 6-1-88  
 Printed & filed high 6-1-88  
 Indexed high 6-1-88  
 Filed in high 6-1-88  
 Well No. C-27-11) 54 sub 1

PAGE.....  
 (Leave blank)

Report No. 6163  
 Filed May 7, 1948  
 Rec. By gjt  
 Ret'd .....

## Report of Well and Tunnel Driller STATE OF UTAH

(Separate report shall be filed for each well or tunnel)

### GENERAL INFORMATION:

Report of well or tunnel driller is hereby made and filed with the State Engineer, in compliance with Sec. 100-3-22, Utah Code Annotated, 1943. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of well or tunnel. Failure to file such report constitutes a misdemeanor.)

1. Name and address of person, company or corporation boring or drilling well or tunnel.  
 (Strike words not needed)

Archie C. Myers - 2117 Bank St. Bakersfield, Calif.

2. Name and address of owner of well or tunnel.

(Strike Words not needed)

Metal Producers Corp., Milford, Utah

3. Source of supply is in Beaver

County;

(Leave blank)

drainage area;

(Leave blank)

artesian basin

4. The number of approved application to appropriate water is A 19178

5. Location of well or mouth of tunnel is situated at a point N 65° E, 4850 Ft. From  
N.W. 1/4 Sec. 3 - T28 S, R11 W, S1 B & M.

(Describe by rectangular co-ordinates or by one course and distance with reference to U. S. Government Survey  
 Corner - Copy description from well owner's approved application)

6. Date on which work on well or tunnel was begun 10-23-47

(Strike words not needed)

7. Date on which work on well or tunnel was completed or abandoned 12-15-47

(Strike words not needed)

8. Maximum quantity of water measured as flowing, pumped or no account taken on completion of  
 well or tunnel in sec. ft. ?; or in gals. per minute ? Date.....

(Strike words not needed)

### DETAIL OF COLLECTING WORKS:

9. WELL: It is drilled, dug, flowing or pump well. Temperature of water ? °F.  
 (Strike words not needed)

(a) Total depth of well is 500 ft. below ground surface.

(b) If flowing well, give water pressure (hydrostatic head) above ground surface ND ft.

(c) If pump well, give depth from ground surface to water surface before pumping 274  
Pumping; during pumping ?

(d) Size and kind of casing 341 Ft. of 16" x 14" & 162 Ft. of 14" x 14"

(If only partially cased, give details)

(e) Depth to water-bearing stratum 478 Ft.

(If more than one stratum, give depth to each)

(f) If casing is perforated, give depth from ground surface to perforations 380 Ft.

(g) Log of well 0' - 82' Lava Flow Fill - 82' - 85' Boulders  
85' - 110' Gravel & Boulders 110' - 160' Clay & Gravel  
160' - 165' Boulders 165' - 210' Clay & Gravel  
210' - 215' Boulders 215' - 257' Course sandy clay  
257' - 306' Clay & Gravel 306' - 354' Conglomerate  
 (see remarks)

(h) Well was equipped with cap, valve, or OPV to control flow.  
 (Strike words not needed)

(Over)

#5

10. TUNNEL: It is timbered, tiled, piped, open, bulkheaded, covered or.....  
(Strike words not needed)

(a) Dimensions.....; total length.....; temperature of water.....°F.

(b) Position of water bearing stratum or strata with reference to mouth of tunnel.....

(c) Log of tunnel.....

11. GENERAL REMARKS: (Note any general or detailed information not covered above).

Continued log of Hole

354'-389' coarse sandy clay  
389'-478' soft conglomerate  
478'-481' sand (wet)  
481'-497' decomposed granite  
497'-500' granite

STATE OF UTAH,

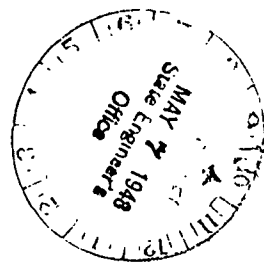
COUNTY OF

Salt Lake

ss.

I, V. P. Lucas Foreman, being first duly sworn,

do hereby certify that I am the driller of the aforesaid well or tunnel who furnished the foregoing statement of facts; that I have read said statement and each and all of the items therein contained are true to the best of my knowledge and belief.



Archie C. Myers  
By V. P. Lucas Foreman  
Driller

Subscribed and sworn to before me this 7 day of May, 1948.

(SEAL)

William E. Monahan  
Notary Public

My Commission Expires:

July 18 1948